DOCUMENT RESUME

ED 398 845 HE 029 466

AUTHOR Lefberg, Irv; And Others
TITLE Long-Term Economic and Labor Forecast Trends for Washington. 1996.
INSTITUTION Washington State Employment Security, Olympia.; Washington State Office of Financial Management, Olympia.
PUB DATE Jul 96
NOTE 76p.
PUB TYPE Reports - Descriptive (141)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Change Agents; *Demand Occupations; *Demography; Employment Opportunities; *Employment Patterns; Employment Statistics; Females; Futures (of Society); Higher Education; *Labor Market; Males; Migration Patterns; Salaries; *Statistical Data; Tables (Data); Trend Analysis
IDENTIFIERS *Washington

ABSTRACT

This publication provides actual historical and long-term forecast data on labor force, total wage and salary employment, industry employment, and personal income for the state of Washington. The data are based upon the Washington Office of Financial Management long-term population forecast. Chapter 1 presents long-term forecasts of Washington population and net migration. Chapter 2 offers long-term forecasts of the Washington labor force including effects of population growth, migration, changes in labor force participation, the "new labor force," and challenges of the changing labor force. Chapter 3 provides the long-term forecast of Washington wage and salary employment broken down by specific areas for goods producing employment (such as lumber, paper, and aerospace) and non-goods producing employment (such as trade, services, and government). Chapter 4 provides the long-term forecast of Washington per capita personal income. Chapter 5 is a special report on changes in real average earnings in Washington which provides an analysis of data from 1979 through 1994. Chapter 6 is a special report on earnings differences, including differences by education, among Washington workers, noting a decline in average earnings and a greater inequality in earnings. A total of 26 figures and 12 tables detail the statistical data supporting the narrative analysis. (CK)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 398 845

FORECASTING DIVISION

STATE OF WASHINGTON

1996 LONG-TERM ECONOMIC AND LABOR FORECAST TRENDS FOR WASHINGTON

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

Office of Financial Management, State of Washington

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

HE 029 466

WASHINGTON STATE
OFFICE OF FINANCIAL MANAGEMENT
FORECASTING DIVISION

WASHINGTON STATE
EMPLOYMENT SECURITY DEPARTMENT
LABOR MARKET & ECONOMIC
ANALYSIS BRANCH

JULY 1996

BEST COPY AVAILABLE

FORECASTING DIVISION

STATE OF WASHINGTON

1996 LONG-TERM ECONOMIC AND LABOR FORECAST TRENDS FOR WASHINGTON

WASHINGTON STATE
OFFICE OF FINANCIAL MANAGEMENT
FORECASTING DIVISION

WASHINGTON STATE
EMPLOYMENT SECURITY DEPARTMENT
LABOR MARKET & ECONOMIC
ANALYSIS BRANCH

JULY 1996

To obtain this publication in alternative format, contact the Washington State Office of Financial Management ADA Coordinator at (360) 753-5459.

This publication available electronically at: http://www.wa.gov/ofm

Preface

1996 Long-Term Economic and Labor Force Trends for Washington is a joint publication of the Washington State Office of Financial Management (OFM), Forecasting Division, and the Washington State Employment Security Department (ESD), Labor Market and Economic Analysis Branch. The publication provides actual historical and long-term forecast data on labor force, total wage and salary employment, industry employment, and personal income. The long-term labor force and economic forecasts are based upon the 1995 OFM long-term population forecast. The short and medium term (three to five year) employment and labor force forecasts are consistent with the November 1995 Economic and Revenue Forecast Council official state economic forecast.

Prepared by:

Irv Lefberg, Jim Schmidt, and Ta-Win Lin, Office of Financial Management;
Dennis Fusco and Robert Baker, Employment Security Department.

Contents

Preface i
Contents ii

CHAPTER I
Long-Term Forecasts of Washington Population and Net Migration 1
Net Migration in Washington 1
Net Migration Forecast for Washington 3
Natural Increase Forecast for Washington 4

CHAPTER II
Long-Term Forecasts of Washington Labor Force 7
Population Growth and the Labor Force 8
Migration 9
Changes in Labor Force Participation 10
Male Labor Force Participation 11
Female Labor Force Participation 13
Total Labor Force Participation 14
The Labor Force Forecast 15
The "New Labor Force" 18
Aging, Female, and Non-White Workforce 18
Challenges of the Changing Workforce 19

CHAPTER III
Long-Term Forecast of Washington Wage & Salary Employment 21
Long-Term Employment Trends 21
Goods Producing Employment 23
Lumber and Wood Products 26
Paper and Allied Products 27
Aerospace 27
Other Transportation Equipment 28
Primary Metals 28
Machinery and Instruments 29
Agriculture and Food Processing 29
Construction 30
Non-Goods Producing Employment 31
Transportation, Communication, and Utilities (TCU) 31
Wholesale Trade 31
Retail Trade 32
Finance, Insurance, and Real Estate (FIRE) 32
Services 33
State and Local Government 33
Federal Government 34

CHAPTER IV
Long-Term Forecast of Washington Per Capita Personal Income 35
Trends in Per Capita Income 36
The Outlook for Washington Per Capita Income 38
Washington Compared to the U.S. 38
Appendix: The Model 41

CHAPTER V – SPECIAL REPORT
Changes in Real Average Earnings in Washington: An Update to 1994 43
Components of the Earnings Decline 43
Industry Composition 44
Incidence of Part-Time Jobs 44
Changes in Earnings Within Industries 44
State versus National Factors 45
Real Average Earnings Decline in Washington, 1979-1988 45
Partial Rebound in Washington Real Average Earnings, 1988-1994 46
Toward an Explanation of the Earnings Decline 47
National Factors in the Change in Industry Composition, 1979-1988 47
State Factors in the Change in Industry Composition, 1979-1988 47
National Factors in the Earnings Decline Within Industry Sectors, 1979-1988 .. 48
State Factors in the Earnings Decline Within Industry Sectors, 1979-1988 48

CHAPTER VI – SPECIAL REPORT
Earnings Differences Among Washington Workers 51
Overview 51
Overall Earnings Decline 51
Earnings Decline by Age and Education Group 52
Differences in Earnings Between Men and Women 52
Differences by Racial Categories 52
Differences by Education 52
Differences by Industry Sector 52
Decline in Average Earnings 59
Greater Inequality in Earnings 59
Effects of International Trade on Income 60
Declining Negotiating Strength of Workers 61
Demographics of the Baby Boom 61
Non-Wage Benefits 61
Payroll Taxes 62
Technological Advances and the Education Premium 62
Some General Conclusions 62

FIGURES

Chapter I

I-1 Net Migration and Basic Sectors Employment Change 2
I-2 Net Migration and Population Change 4
I-3 Births and the Total Fertility Rate in Washington 5

Chapter II

II-1 Population Growth Rates for Ages 16-64 7
II-2 Population Estimates and Forecasts for Ages 16-24 8
II-3 Population Estimates and Forecasts for Ages 25-54 9
II-4 Male Labor Force Participation Rates 13
II-5 Female Labor Force Participation Rates, Washington 14
II-6 Forecast of Labor Force Distribution by Sex, Washington 16

Chapter IV

IV-1 Real Per Capita Personal Income, 1987 Dollars 35
IV-2 Real Per Capita Personal Income Average Annual Growth Rate 36
IV-3 Ratio of Washington to U.S. Per Capita Income 37
IV-4 Growth of Real Per Capita Income, 1990-2020 39
IV-5 Per Capita Personal Income Trends, 1995-2020 39

Chapter VI

VI-1 Average Annual Wages by Sex, 1979 & 1989 53
VI-2 Wage Growth by Sex, 1979-1989 53
VI-3 Average Annual Wages by Race, 1989 54
VI-4 Wage Growth by Race, 1979-1989 54
VI-5 Average Annual Wages by Education Level, 1989 55
VI-6 Wage Growth by Education Level, 1979-1989 55
VI-7 Average Annual Wages by Industry, 1989 56
VI-8 Wage Growth by Industry, 1979-1989 56
VI-9 Average Annual Wages by Age Group, 1989 57
VI-10 Wage Growth by Age Group, 1979-1989 57
VI-11 Average Annual Wages by Income Range, 1989 58
VI-12 Wage Growth by Income Range, 1979-1989 58

TABLES

Chapter I

I-1 Components of Population Change: 1980-2020 6

Chapter II

II-1 Washington Labor Force Participation Rates by Age and Sex, 1990 and 2020 12
II-2 Labor Force Change by Decade 15
II-3 Actual and Forecast Washington Labor Force 17
II-4 Labor Force Composition by Race, Washington 19

Chapter III

III-1 Washington Labor Force and Employment 22
III-2 Washington Non-Agricultural Wage and Salary Employment by Industry 24
III-3 Percentage Share of Total Non-Agricultural Wage and Salary Employment 25

Chapter IV

IV-1 Real Per Capita Income Trends, Washington and U.S. 40
Washington Long-Term Per Capita Personal Income (PCPI) Model 41

Chapter V

V-1 Washington Real Average Earnings, 1979-1988: Components of Change 45
V-2 Washington Real Average Earnings, 1988-1994: Components of Change 46
V-3 Decomposition of Average Earnings 49

I.

Long-Term Forecasts of Washington Population and Net Migration

A significant portion of the long-term forecast for the state's labor force and employment through the year 2020 depends on the state's long-term population forecast. The population forecast results from the combined effects of two components: natural increase and net migration. The basic elements of natural increase are births and deaths. These population elements tend to change gradually over time. The other major component, net migration, is heavily influenced by economic conditions. Net migration tends to be highly variable since it responds quickly to changing economic conditions.

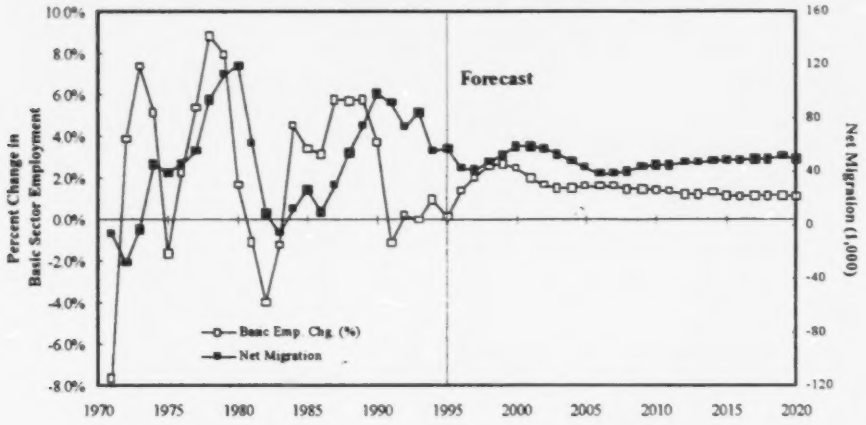
Net Migration in Washington

Population movements are fundamentally related to relative changes in labor market and economic conditions. Expanding economies and labor markets tend to "pull" people into an area, while contracting economies and labor markets tend to "push" people out of an area. The difference between out-migration and in-migration is net migration. These "push" and "pull" factors have made net migration the major contributor to population change in Washington State. The historical effects of these factors are evident in the past net migration patterns for the state of Washington. Large increases in population from net migration occurred as a result of rapid economic expansion in Washington State during the late 1970s and late 1980s. When economic conditions worsened in 1970-1973 and 1981-83, net migration dropped sharply. In several of those years there was actually net out-migration. In the late 1980s when the state economy again experienced strong growth, there was a significant increase in net-migration.

The slowing of economic growth over the last five years in the state restrained the growth in population due to net migration, but not to the same degree that it had in the past. One major reason is that employment in Washington continued to grow during the U.S. recession of 1990-91. This made Washington relatively attractive to those seeking jobs compared to other states, which were losing jobs. The relative strength of the Washington economy compared to the rest of the U.S. helped to "pull" more job-seekers into the state. In addition, the state of California, which experienced a decline in employment starting about the same time as the U.S. recession, remained in recession well into 1993. Even though Washington began to experience a significant reduction in aerospace jobs beginning in 1992, the overall Washington economy continued to perform much better than the California economy. For the last five years California has experienced an average out-migration of over 400,000 persons per year. These two factors,

among others, have helped to produce fairly high levels of net migration into Washington during the 1990s even though the state's economy grew more slowly than in the late 1980s.

Figure I-1
Net Migration and Basic Sectors Employment Change



Increases in "basic" or "traded" sector employment are a major catalyst for attracting additional population. These basic or traded sectors of the economy include manufacturing, civilian federal government, and producer services (services purchased by businesses and government agencies). These sectors are considered to be basic or traded sectors because the demand for their output is mostly determined outside the state. For example, most of the aluminum produced in the state is fabricated into consumer products by businesses outside the state. The jobs in these areas also tend to be high-wage jobs, which is another attraction to job-seekers outside the state. When the aerospace sector of Washington's economy expands, for instance, net migration increases. On the other hand, when these sectors decline net migration falls.

Workers, especially professionals, from other states are also actively recruited by Washington companies. Some of the expansion in jobs include positions which require specialized skills or education that are in short supply among Washington workers. For example, during an expansion Boeing Aircraft Company may require as many as 3,000 aerospace engineers. If those engineers are not available in the state's labor pool, they will have to come from outside the state.

Some migration is unrelated to labor market changes. These changes include movements of military personnel and migration of the retired population (principally persons over 65). Some people move to Washington for the quality of life, the recreational opportunities, or to escape the urban life. However, these migrants tend to make up a relatively small share of the total movement of population into and out of Washington State.

The impact of net migration on the labor force depends largely on the age composition of migrants. While some migration consists of retired persons who are relocating, a majority of the net migration to Washington has been related to employment opportunities. Therefore, migration will have an important impact on the size of the labor force throughout the forecast period.

Net Migration Forecast for Washington

The first step in forecasting net migration through the year 2020 is to forecast employment in each of the basic economic sectors. A system of equations describing the determinants of employment in each of the 17 manufacturing sectors, the federal civilian sector and the basic services sectors was constructed. The basic services sector consists of business services, legal services, and engineering, accounting, research, management, and related services. Next, a single equation model relating net migration to labor market and economic conditions in Washington relative to the rest of the country was built. That model includes the following factors:

- The percentage change in Washington's basic or traded sectors relative to the percentage change in employment in U.S. (The U.S. forecast is DRI's Winter 1995-96 long-term trend forecast.)

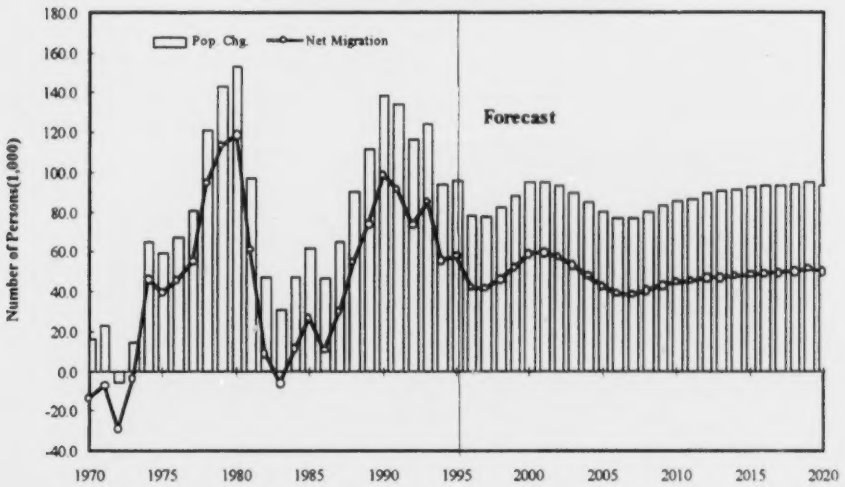
- The percentage change in Washington's basic or traded sectors relative to the percentage change in employment in California. (For the period 1994 through 1997 the employment forecast from the UCLA Business Forecasting Project was used. After 1997, the long-term growth rate of California employment was used for the long-term forecast. The long-term historical growth rate of employment in California is about 2.5 percent.)

Net migration is forecast to maintain a long-term average of about 48,000 persons per year. (Population statistics, including net migration, are shown in Table I-1 at the end of this chapter.) This is slightly above the 30-year historical average of about 47,000 per year. When the employment in the basic or traded sectors is growing faster than employment in the rest of the U.S., people move here to take advantage of the relatively better economic and employment situation. In addition, wages in the basic or traded sector tend to be higher than average wages. When these types of jobs are increasing relative to other places in the country, migrants are attracted to this state.

The main reason that Washington net migration over the forecast period is expected to be slightly higher than the historical average — even though aerospace employment is not forecast to reach its previous peak — is that Washington is expected to perform better than the U.S. and California economies. For example, manufacturing employment is expected to grow modestly in Washington over the forecast horizon, while manufacturing employment in the U.S. is expected to gradually decline. Also, business services employment is expected to grow at an average rate of 3.3 percent during the forecast period. This is expected to equal, or slightly surpass, national growth in these industries and will help keep net migration slightly higher than the historical average over the forecast period.

Once completed, the net migration forecast becomes a factor in the population model.

Figure I-2
Net Migration and Population Change

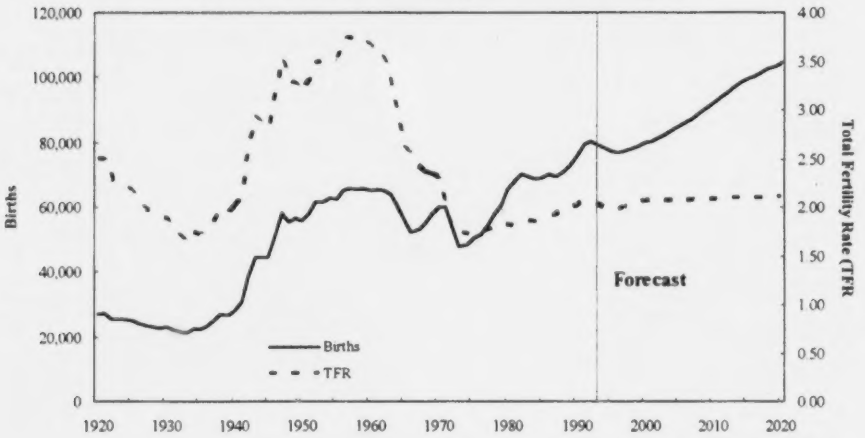


Natural Increase Forecast for Washington

Natural change is the second major component of the population forecast. Natural changes are the result of additions to the population through births and reductions in the population due to deaths. The age structure of the population is also an important consideration for any long-term forecast of the labor force and employment, since labor force participation rates vary by age group, sex and race.

The total fertility rate, which represents the estimated number of births women expect during their childbearing years, is expected to remain around 2.1 births per woman in Washington through the end of the forecast period in 2020. This is somewhat above the all-time low of 1.6 births per woman experienced in 1933 but far below the peak of 3.7 births per woman in 1957. The increased labor force participation rate for women of child-bearing age is expected to keep the total fertility rate from increasing substantially. Also, women are marrying later, having children later, are more likely to divorce and are spending more time obtaining education compared to the Baby Boom period. However, while the fertility rate is expected to remain constant throughout the forecast, the number of women of childbearing age is predicted to grow steadily. As a result, the annual number of births in Washington is expected to increase from 77,000 in 1994-1995 to about 104,000 in 2019-2020.

Figure I-3
Births and the Total Fertility Rate in Washington



By definition, the labor force includes only those aged 16 and older. Births affect the labor force with a lag, as individuals born today will not be potential members of the labor force for 16 years. Since the forecast period covered here is 25 years, population changes due to births cannot affect the labor force until the latter years of the forecast period. This means that anyone born in 1995 will not be old enough to enter the labor force until 2011. By the same token, demographic changes in the last 16 years have a significant impact on the labor force forecast for the 1995-2010 period. Although the annual number of births in the early 1970s dropped to less than 50,000 for the first time in 25 years, the annual number of births rebounded to more than 70,000 in 1981-1982. By 1990 the annual number of births had increased to 76,400. The increase in births in the 1980s will mean an increase in the number of people in the workforce in the next two decades.

Mortality, the other component of natural increase, will also rise throughout the forecast period. Life expectancy increased rapidly between 1920 and 1960. Although it continued to improve in the 1980s, it increased at a much slower rate. Since most of the improvements were achieved through combating infant deaths, continued dramatic improvement in life expectancy at birth is unlikely. Thus, life expectancy for both males and females in Washington will continue to increase, but at a slow and steady rate. Washington's population is also aging. As a consequence, the proportion of all deaths that are accounted for by the deaths of older persons will increase during the forecast period. However, deaths which occur during the forecast period will not have a major impact on the labor force because the majority of deaths occur at ages when individuals are unlikely to be in the labor force.

Table 1 on the next page shows the components of actual and forecast Washington population change.

Table I-1
Components of Population Change: 1980 - 2020

Period	Population at End of Period	Components of Change from Previous Period								
		Population Change		Births		Deaths		Natural Increase	Net Migration	
		Number	Percent	Number	Rate(%)	Number	Rate(%)		Number	Rate(%)
1980-1981	4,229,300	96,900	2.30	68,200	16.30	31,800	7.60	36,300	60,600	14.50
1981-1982	4,276,500	47,300	1.12	70,100	16.48	31,700	7.45	38,300	8,900	2.09
1982-1983	4,307,200	30,700	0.72	69,500	16.19	32,500	7.57	36,900	-6,200	-1.44
1983-1984	4,354,100	46,800	1.09	68,500	15.82	33,200	7.67	35,200	11,600	2.68
1984-1985	4,415,800	61,700	1.42	69,100	15.76	34,000	7.75	35,100	26,600	6.07
1985-1986	4,462,200	46,400	1.05	70,200	15.81	34,000	7.66	36,200	10,200	2.30
1986-1987	4,527,100	64,900	1.45	69,300	15.42	34,400	7.65	34,900	30,000	6.67
1987-1988	4,616,900	89,800	1.98	71,000	15.53	36,000	7.87	35,000	54,800	11.99
1988-1989	4,728,100	111,200	2.41	73,000	15.62	36,000	7.70	37,000	74,200	15.88
1989-1990	4,866,700	138,600	2.93	76,400	15.93	36,200	7.55	40,100	98,500	20.53
1990-1991	5,000,400	133,700	2.75	79,100	16.03	36,600	7.41	42,500	91,200	18.49
1991-1992	5,116,700	116,300	2.33	80,200	15.86	37,200	7.35	43,100	73,200	14.48
1992-1993	5,240,900	124,200	2.43	79,100	15.27	39,400	7.60	39,700	84,500	16.31
1993-1994	5,334,400	93,500	1.78	78,200	14.79	39,500	7.48	38,700	54,900	10.37
1994-1995	5,429,900	95,500	1.79	77,000	14.32	39,900	7.42	37,100	58,400	10.85
1995-1996	5,507,900	78,000	1.44	76,700	14.03	40,700	7.43	36,100	42,000	7.67
1996-1997	5,585,100	77,200	1.40	77,100	13.90	41,500	7.48	35,600	41,500	7.49
1997-1998	5,667,200	82,100	1.47	77,700	13.82	42,300	7.52	35,400	46,700	8.29
1998-1999	5,754,900	87,800	1.55	78,600	13.76	43,200	7.56	35,400	52,300	9.17
1999-2000	5,849,900	95,000	1.65	79,700	13.74	43,900	7.57	35,800	59,200	10.20
2000-2001	5,945,000	95,100	1.63	80,400	13.64	44,700	7.58	35,700	59,400	10.07
2001-2002	6,037,800	92,800	1.56	81,300	13.58	45,500	7.59	35,900	57,000	9.51
2002-2003	6,127,200	89,400	1.48	82,400	13.55	46,100	7.58	36,300	53,000	8.72
2003-2004	6,211,800	84,600	1.38	83,600	13.55	46,900	7.60	36,700	47,900	7.76
2004-2005	6,291,800	80,000	1.29	84,800	13.56	47,700	7.63	37,100	42,900	6.86
2005-2006	6,368,100	76,400	1.21	86,000	13.59	48,400	7.64	37,600	38,700	6.12
2006-2007	6,444,800	76,700	1.20	87,400	13.64	49,100	7.66	38,300	38,400	5.99
2007-2008	6,524,600	79,800	1.24	88,900	13.71	49,800	7.68	39,100	40,700	6.28
2008-2009	6,607,800	83,200	1.28	90,500	13.78	50,500	7.69	40,000	43,200	6.58
2009-2010	6,693,300	85,500	1.29	92,100	13.85	51,200	7.70	40,900	44,600	6.71
2010-2011	6,779,700	86,400	1.29	93,600	13.89	52,100	7.73	41,500	44,800	6.66
2011-2012	6,868,700	89,000	1.31	95,100	13.94	52,900	7.75	42,300	46,700	6.85
2012-2013	6,958,900	90,200	1.31	96,700	13.98	53,700	7.77	43,000	47,300	6.83
2013-2014	7,049,800	90,900	1.31	98,100	14.01	54,600	7.80	43,500	47,400	6.77
2014-2015	7,142,100	92,300	1.31	99,300	14.00	55,500	7.83	43,800	48,500	6.84
2015-2016	7,235,100	92,900	1.30	100,300	13.95	56,500	7.86	43,800	49,200	6.84
2016-2017	7,328,300	93,200	1.29	101,300	13.91	57,600	7.91	43,700	49,500	6.79
2017-2018	7,422,100	93,800	1.28	102,300	13.87	58,600	7.95	43,700	50,200	6.80
2018-2019	7,517,100	95,000	1.28	103,200	13.81	59,800	8.00	43,400	51,600	6.90
2019-2020	7,610,100	93,000	1.24	104,000	13.74	61,000	8.06	43,000	50,100	6.62
1980-1990		734,300		705,300		339,800		365,000	369,200	
1990-2000		983,200		783,500		404,100		379,400	603,800	
2000-2010		843,400		857,500		479,900		377,600	465,800	
2010-2020		916,800		993,900		562,300		431,600	485,200	
1990-2010		3,477,700		3,340,200		1,786,200		1,553,600	1,924,000	

Source: Forecasts of the State Population by Age and Sex: 1990 to 2020, Office of Financial Management, November 1995 Forecast; and 1995 Population Trends for Washington State, Office of Financial Management, October 1995.

II.

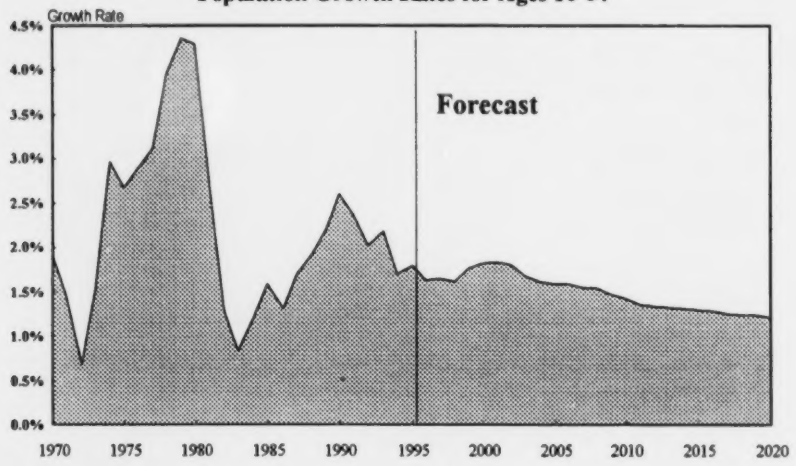
Long-Term Forecasts of Washington Labor Force

For the purposes of the state's long-term forecast, the term "labor force" refers to the "civilian non-institutional labor force." The civilian non-institutional labor force is composed of all individuals age 16 or over who are currently employed (either part-time or full-time) or who are actively seeking employment. Individuals who are not in the labor force are those who are not employed *and* not seeking employment. Common reasons for not being in the labor force include retirement, ill health or injury, attending school, or doing housework at home. Individuals who are in nursing homes, prison, or the military (referred to as the institutional population) are not considered to be either in the labor force or part of the base population from which the labor force is drawn.

The size and composition of the Washington labor force is affected by: (1) natural population changes (aging, births, and deaths), (2) net-migration (the difference between persons entering and leaving the state), and (3) labor force participation rates (the proportion of persons 16 years of age and older who are employed or seeking employment).

Between 1970 and 1995, the total labor force in Washington State nearly doubled from 1.42 million to 2.80 million. The state is expected to gain an additional 1.01 million workers in the next quarter-century and, by the year 2020, have a total labor force of 3.81 million.

Figure II-1
Population Growth Rates for Ages 16-64

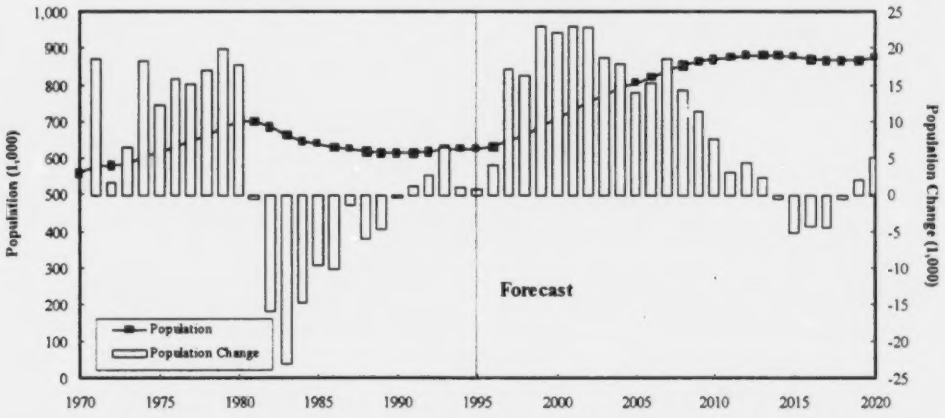


Population Growth and the Labor Force

Population growth in the state directly contributes to its labor pool. In the past 25 years, the number of persons 16 years old and over grew at an annual rate of 2.2 percent in Washington State, significantly higher than the 1.4 percent annual rate for the nation. As a result, the state experienced a labor force growth of 2.8 percent per year between 1970 and 1995, far outpacing the 1.9 percent average growth rate for the U.S during the same period.

Although growth in Washington's labor force will continue to outpace that of the nation as a whole, state labor force growth will slow down considerably in the next 25 years.

Figure II-2
Population Estimates and Forecasts for Ages 16-24



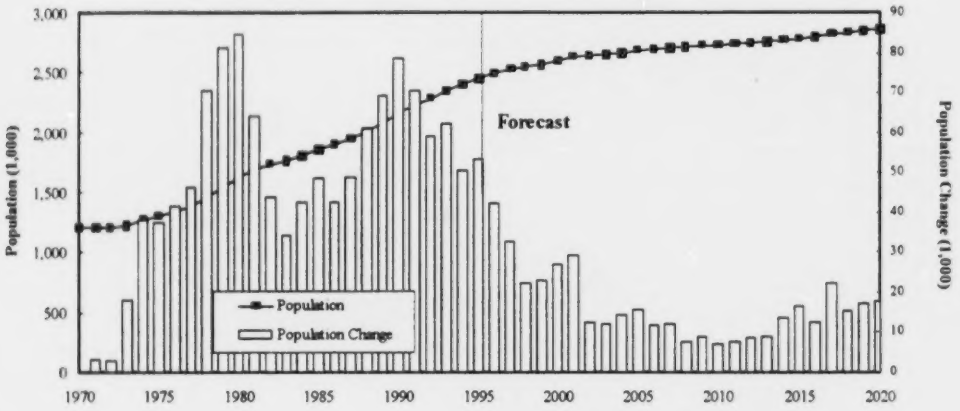
One factor that will contribute to a slow growth of the working age population in the near term is slow growth in the state's youth population. The decline in the youth population is due to lower birth rates beginning in the early 1960s. The state's population in the 16-to-24 age cohort declined throughout the decade of the 1980s (Figure II-2). Since the early 1990s, that population group began to grow again, albeit slowly. Population growth for this age group is expected to further accelerate in the second half of the 1990s and, by the turn of the century, approach the high growth levels reached in the 1970s. After the year 2000, growth of this age group in the state will once again decline.

Another factor in the anticipated slowdown in growth of the state's labor force is the decline in the growth rates of the population groups with high labor force participation rates. The population in the 25 to 54 age group, the most active labor force participants, grew at an annual average rate of 2.9 percent, or 50,000 persons per year, from 1970 to 1995. The growth will drop substantially to an annual average of 17,000 persons in the next 25 years, according to the state population forecast. The forecast shows that the annual growth rate of the population in this age group will decline to about 1.2 percent for the rest of the 1990s. During the years between 2000 and 2020, the annual growth rate is expected to drop to only 0.5 percent, far below the

average growth rates of 3.0 percent and 1.9 percent per year in the 1980s and the 1990s, respectively (Figure II-3).

At the turn of the century, the first cohort of post-war "baby boomers" will reach early retirement age; their labor market behavior will significantly affect the state's labor force.

Figure II-3
Population Estimates and Forecasts for Ages 25-54



Migration

Migration is an important contributor to population change, and thus labor force growth, in Washington State. Migration into Washington has historically exceeded migration out of the state. In the past 25 years, net migration in the state averaged 48,200 per year, accounting for about 60 percent of the state population growth. There is a cyclical pattern to migration, related to periods of economic expansion and contraction in the state. For example, net migration in the state averaged 53,500 per year during the booming period from 1986 to 1990, compared to the annual level of 20,300 persons in the first half of the 1980s. Net gains in the state's population that result from migration are most often directly associated with its economic growth and labor force expansion.

Even though aerospace is not expected to reach its peak levels of the late 1970s or the late 1980s, net migration is expected to be slightly above the historical, 30-year average during the forecast period due mainly to growth in manufacturing (overall) and other traded sector jobs:

- Business services will continue to grow at a quick pace, although not at the same rapid rate as in the 1980s. Most of the fast-growing business services sectors recruit from the national, or even international, labor markets; their growth will surely attract labor from outside the state.

- Manufacturing in Washington other than lumber and wood products, will grow at a faster rate than in the U.S. Manufacturing jobs offer above-average wages and support a variety of other jobs in the economy and thus stimulate the demand for labor and for labor-related in-migration.

- Employment in basic (export-oriented) industries in Washington and total employment in the state are expected to grow faster than in the U.S. throughout the forecast period.

- Employment in basic industries in Washington is expected to grow faster than California employment throughout the forecast period. Historically, the largest migration flow into Washington has come from California. The expected strong growth of the basic industries in Washington suggests that the state economy will continue to attract a large number of California migrants.

- There has been an increasing number of migrants over 65 years old to Washington. Migration decisions of senior citizens are mainly determined by quality of life, amenities, and services. Senior migrants affect the state labor market differently than economic related migrants . On one hand, they are not competing for job opportunities; on the other hand, the assets and incomes they bring with them contribute to the local economy and the demand for labor. At the same time senior citizens are relatively heavy users of private and private health services and other government services.

As a result of the above-mentioned economic and non-economic forces, net-migration between 1995 and 2020 will total about 1.19 million persons, averaging about 48,000 per year, slightly higher than the 47,000 average of the past 30 years.

The age composition of migrants will also affect the state's labor force. Nationwide, the proportion of the population that is retired or over age 65 is expected to increase significantly through the forecast period. This suggests that the proportion of in-migrants that are retired or over age 65 will increase. Although net migration will remain fairly steady over the forecast horizon, the proportion of net migrants that will join the labor force is expected to fall because of the age composition of the in-migrants.

Changes in Labor Force Participation

Labor force participation rates in Washington State historically have been higher than the national average, due in large part to a higher concentration of young people, who have higher rates of labor force participation.

The total labor force participation rate in Washington State increased from 61.5 percent in 1970 to 69.6 percent in 1995. During this period, the male labor force participation rate declined gradually, while the female labor force participation rate rose substantially. The total labor force participation rate in the state is projected to decline to 65.4 percent by the year 2020. Most of the decline will take place during the decade from 2010 to 2020.

The projected decline in total labor force participation is due mainly to changes in the age composition of the labor force. However, as discussed below, some of the overall decrease is related to an expected decline in the labor force participation rates of certain age groups. For both males and females, labor force participation is highest between the ages of 20 and 54; it is somewhat lower for ages 16 to 19 and ages 55 to 64; and it is very low for persons age 65 and over.

Between 2010 and 2020, the proportion of the state population in the older age groups will increase dramatically. The elderly population, with much lower labor force participation rates, will contribute to a sharp decline in the total labor force participation rates for both male and female population. The total labor force participation rate is expected to decline form 69.5 percent in 2010 to 65.4 percent in 2020. Table II-1 displays a comparison of the 1990 labor force participation rates in Washington State, by age and sex, with the corresponding forecast rates for 2020.

Male Labor Force Participation

The labor force participation rate for males has declined slightly in the past two decades, due primarily to early retirements. Improved retirement options have led to the decline in the labor force participation rates of older men. More generous (public and private) pension systems and social insurance programs (Society Security, Medicare, and employer-provided health insurance, etc.), as well as increases in the wealth and asset incomes of senior citizens are the most commonly mentioned impetus for early retirement. These factors are likely to continue to place downward pressure on the total male labor force growth. Nationally, the labor force participation rate of males aged 55 to 64 years old dropped from 83.0 percent in 1970 to 65.5 percent in 1995.

It should be noted, however, that some of the factors contributing to declining labor force participation rates among people over age 55 will be working in reverse. Some researchers argue that the preference for early retirement aside, people over age 55, will be forced to work longer because most of them do not possess sufficient economic resources to maintain desired life styles. A longer life expectancy also contributes to the need for extending working years. These assumptions have been taken into account in the present labor force forecasts for the state. This means that, although labor force participation rates for people age 55 to 64 are still expected to decline, the drop will be less steep than in the past. For Washington, the labor force participation rate of males between 55 and 64 years of age is projected to decline from 65.9 percent in 1995 to 62.1 percent by the year 2010, and remains unchanged between 2010 and 2020. (Figure II-4)

Table II-1
Washington Labor Force Participation Rates by Age and Sex, 1990 and 2020

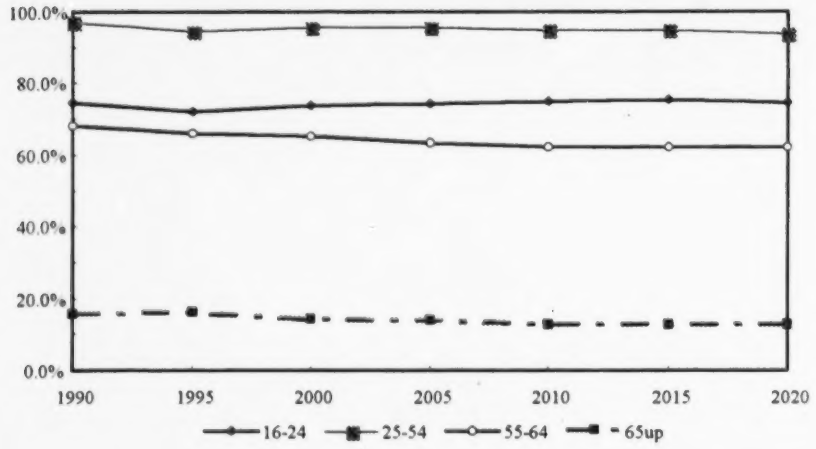
	1990 TOTAL LABOR FORCE			2020 TOTAL LABOR FORCE			DIFFERENCE, 1990-2020 TOTAL LABOR FORCE		
Age	Labor Force Participation Rate (LFPR)	Labor Force	Percent of Total Labor Force	Labor Force Participation Rate (LFPR)	Labor Force	Percent of Total Labor Force	Net Labor Force Additions	Percent Change	Percentage of Net Additions to Total Labor Force
16-19	58.1	147,500	5.8%	55.6	212,400	5.6%	64,900	44.0%	5.1%
20-24	81.4	270,800	10.7%	82.8	384,100	10.1%	113,300	41.8%	8.9%
25-34	85.9	710,900	28.1%	86.9	889,000	23.3%	178,100	25.1%	13.9%
35-44	88.2	703,300	27.8%	90.8	852,700	22.4%	149,400	21.2%	11.7%
45-54	84.3	423,400	16.7%	88.1	757,600	19.9%	334,200	78.9%	26.2%
55-64	56.2	213,200	8.4%	58.3	591,000	15.5%	377,800	177.2%	29.6%
65+	11.6	63,300	2.5%	9.9	122,200	3.2%	58,900	93.0%	4.6%
TOTAL	69.6	2,532,300	100.0%	65.4	3,809,100	100.0%	1,276,800	50.4%	100.0%

	1990 MALE LABOR FORCE				2020 MALE LABOR FORCE				DIFFERENCE, 1990-2020 MALE LABOR FORCE			
Age	Labor Force Participation Rate (LFPR)	Labor Force	Percent of Male Labor Force	Percent of Total Labor Force	Labor Force Participation Rate (LFPR)	Labor Force	Percent of Male Labor Force	Percent of Total Labor Force	Net Labor Force Additions	Percent Change	Percentage of Net Additions to Male Labor Force	Percentage of Net Additions to Total Labor Force
16-19	57.9	74,300	5.3%	2.9%	56.1	108,600	5.4%	2.9%	34,300	46.2%	5.5%	2.7%
20-24	87.9	143,400	10.3%	5.7%	90.0	206,800	10.2%	5.4%	63,400	44.2%	10.2%	5.0%
25-34	97.6	396,100	28.3%	15.6%	95.4	486,900	24.1%	12.8%	90,800	22.9%	14.7%	7.1%
35-44	97.5	384,600	27.5%	15.2%	94.5	447,900	22.2%	11.8%	63,300	16.5%	10.2%	5.0%
45-54	94.4	238,400	17.0%	9.4%	91.1	396,600	19.7%	10.4%	158,200	66.4%	25.6%	12.4%
55-64	68.2	125,500	9.0%	5.0%	62.1	302,800	15.0%	7.9%	177,300	141.3%	28.7%	13.9%
65+	15.7	36,700	2.6%	1.4%	12.6	68,000	3.4%	1.8%	31,300	85.3%	5.1%	2.5%
MEN	79.4	1,398,900	100.0%	55.2%	79.3	2,017,700	100.0%	53.0%	618,800	44.2%	100.0%	48.5%

	1990 FEMALE LABOR FORCE				2020 FEMALE LABOR FORCE				DIFFERENCE, 1990-2020 FEMALE LABOR FORCE			
Age	Labor Force Participation Rate (LFPR)	Labor Force	Percent of Male Labor Force	Percent of Total Labor Force	Labor Force Participation Rate (LFPR)	Labor Force	Percent of Female Labor Force	Percent of Total Labor Force	Net Labor Force Additions	Percent Change	Percentage of Net Additions to Female Labor Force	Percentage of Net Additions to Total Labor Force
16-19	58.3	73,200	6.5%	2.9%	55.2	103,800	5.8%	2.7%	30,600	41.8%	4.7%	2.4%
20-24	75.2	127,400	11.2%	5.0%	75.8	177,300	9.9%	4.7%	49,900	39.2%	7.6%	3.9%
25-34	74.7	314,800	27.8%	12.4%	78.4	402,100	22.4%	10.6%	87,300	27.7%	13.3%	6.8%
35-44	79.1	318,700	28.1%	12.6%	87.1	404,800	22.6%	10.6%	86,100	27.0%	13.1%	6.7%
45-54	74.2	185,000	16.3%	7.3%	85.0	361,000	20.2%	9.5%	176,000	95.1%	26.7%	13.8%
55-64	44.9	87,600	7.7%	3.5%	58.0	288,200	16.1%	7.6%	200,600	229.0%	30.5%	15.7%
65+	8.6	26,600	2.3%	1.1%	8.6	54,200	3.0%	1.4%	27,600	103.8%	4.2%	2.2%
WOMEN	60.5	1,133,400	100.0%	44.8%	60.7	1,791,400	100.0%	47.0%	658,000	58.1%	100.0%	51.5%

BEST COPY AVAILABLE

Figure II-4
Male Labor Force Participation Rates



The male labor force participation rate was affected more than the female rate by the national recession of 1990-91. In addition, the downsizing and cost cutting trend in many large corporations, especially in the midst and aftermath of the recession, caused some male job losers to drop out of the labor market entirely and discouraged others from entering the labor market. The situation for female workers, who were more concentrated in small companies and in less cyclical industries such as retail trade and services, was more favorable.

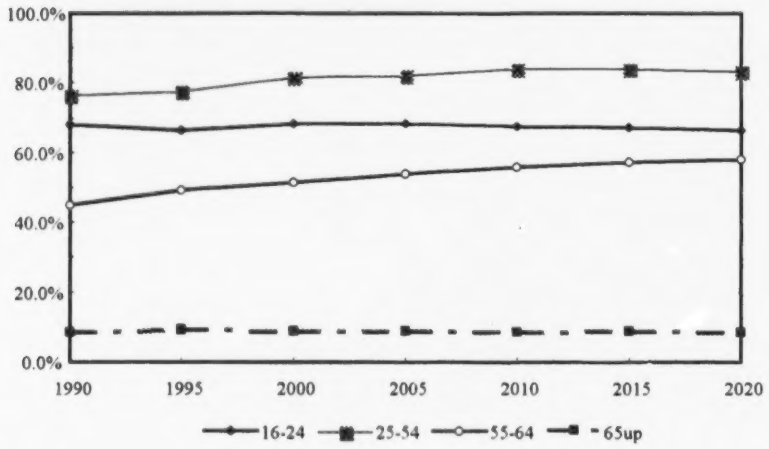
The labor force participation rate of the young male population in the 16 to 24 age group is anticipated to increase through the rest of this decade. The shortage of young labor combined with the effect of defense cutbacks is likely to result in an increased labor force participation rate for males in this age group.

Female Labor Force Participation

One of the most significant labor market phenomena of the last 50 years is the increase of women in the workforce. Increased levels of education, decisions to delay marriage and childbearing, changing gender roles, availability of market substitutes for housework, and changing technologies that make more jobs suitable for women workers, are among the important factors contributing to this trend.

Although the long-term trend of rising female participation in the labor force is expected to continue, the pace of increase will be slower than in the past. Actually, the pace of growth in female labor force participation already started to slow considerably in the mid-1980s as the female rates approached those of males. Although the gap between male and female labor force participation rates will continue to narrow somewhat, it is not likely that the female rates will reach those of males at any time during the forecast period. (Figure II-5)

Figure II-5
Female Labor Force Participation Rates, Washington



Nonetheless, the redefinition of female roles from an emphasis on home-making to a greater emphasis on work outside the home will continue to bring greater percentages of women into the labor market. Economic pressures that lead to the dual income household will also continue to boost female labor force participation. Indeed, the general orientation toward work and overall attachment to the labor force are already roughly comparable for younger men and women. In addition, employers will continue to look to women as an important source of labor due to faster growth in services and trade employment..

However, some gender differences still persist between men and women in terms of perceived parenting and family responsibilities. As female labor force participation rises, there will be emerging pressures on women to balance family and work responsibilities. As a result, women will still experience more frequent and longer spells of time away from work than men. This means that female labor force participation is not likely to reach the male rate in the near future. However, this phenomenon is not expected to reverse the trend of rising female labor force participation. Recent national data show that the female labor force participation rate continues to rise, though at a slower rate than in the previous three decades.

Total Labor Force Participation

The overall women's labor force participation rate in Washington is expected to increase from 60.5 percent in 1990 to 64.3 percent in 2010, and then decline to 60.7 percent by the year 2020. In comparison, the male labor force participation rate is forecasted to decline steadily from 79.4 percent in 1990 to 70.3 percent by 2020. The net result from the changes in the male and the

female labor force participation rates is a lowered total labor force participation rate in the state from 69.6 percent in 1990 to 65.4 percent in 2020.

The Labor Force Forecast

The changes in labor force participation rates, net migration, natural population change, and aging of the population will result in a downward trend for the state's labor force growth. Between 1990 and the year 2000, the Washington labor force is expected to grow by 23.1 percent, representing an average annual growth rate of 2.1 percent. This annual growth rate is significantly lower than the 3.0 percent growth per year that the state experienced in the previous two decades. Between 2000 and 2010, the labor force growth will slow to 1.4 percent per year, or 14.4 percent total growth for the decade. This compares to the decade growth of over 40 percent in the 1970s and nearly 30 percent in the 1960s (Table II-2).

Table II-2
Labor Force Change by Decade

Decade	Changes in Labor Force		
	Number (1000s)	Percent Change	Average Annual Growth
1950-1960	149.8	15.9	5.5
1960-1970	320.1	29.4	2.6
1970-1980	567.5	40.0	3.4
1980-1990	547.7	27.6	2.5
1990-2000	584.9	23.1	2.1
2000-2010	447.9	14.4	1.4
2010-2020	244.0	6.8	0.7

Compared with the relatively slow growth forecast for the Washington labor force, the U.S. labor force is expected to grow at an even slower pace. The major part of the difference between Washington and U.S. labor force growth can be attributed to differences in population growth. For example, between 1995 and 2000, the Washington non-institutional population 16 years old and over is expected to grow an average of 1.5 percent per year. For the U.S., the comparable population group is expected to grow at a rate of about 1.0 percent per year. The difference is caused by the state's continuing ability to attract a relatively high level of migrants.

Washington labor force participation rates have tended to be slightly above national rates, a trend which is expected to continue. Table II-3 provides actual labor force data for Washington between 1970 and 1990 and forecasts of labor force and labor force participation rates for 1995 through 2020. Labor force growth drops significantly between 2010 and 2020, as the baby boom generation reaches retirement age. The growth rate for this decade will be only 0.7 percent per year.

Over the forecast period, the slow but steady increase in labor force participation by females, combined with the small overall decline in male labor force participation, means that the female share of the total labor force will be higher in 2020 than in 1990. In 1990 women were 44.8 percent of the labor force; by 2020 their share will rise to 47.0 percent (Figure II-6). Women will comprise 51.5 percent of "net additions" to the labor force between 1990 and 2020. "Net additions" is the difference between new entrants to the labor force and those who leave the labor force. Net additions should not be confused with new entrants or with the "new labor force" that will be in place in the year 2020.

Figure II-6
Forecast of Labor Force Distribution by Sex, Washington

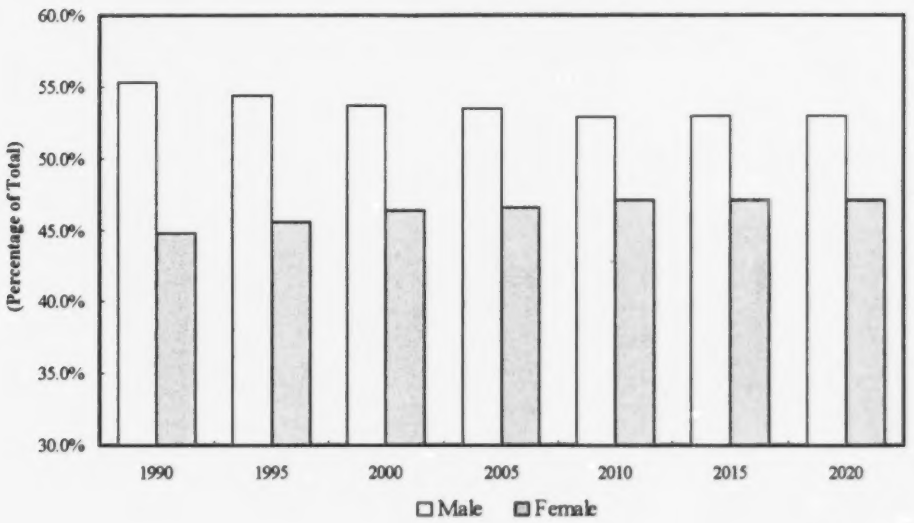


Table II-3
Actual and Forecast Washington Labor Force

Year	Total Population	Civilian Non-Institutional Population			Labor Force			Labor Force Participation Rate		
		Total 16 & Over	Male 16 & Over	Female 16 & Over	Total	Male	Female	Total	Male	Female
1970	3,413,200	2,303,700	1,101,000	1,202,700	1,417,100	na	na	61.5	na	na
1971	3,436,300	2,332,800	1,116,700	1,216,100	1,401,100	na	na	60.1	na	na
1972	3,430,300	2,365,600	1,136,400	1,229,300	1,433,600	na	na	60.6	na	na
1973	3,444,300	2,410,500	1,157,600	1,252,900	1,483,800	na	na	61.6	na	na
1974	3,508,700	2,476,800	1,189,400	1,287,400	1,528,700	na	na	61.7	na	na
1975	3,567,900	2,541,700	1,222,600	1,319,100	1,562,200	942,200	620,000	61.5	77.1	47.0
1976	3,634,900	2,617,300	1,259,700	1,357,600	1,621,400	966,100	655,300	61.9	76.7	48.3
1977	3,715,400	2,706,200	1,304,300	1,401,900	1,692,300	1,003,500	688,900	62.5	76.9	49.1
1978	3,836,200	2,821,100	1,363,500	1,457,600	1,807,800	1,067,000	740,800	64.1	78.3	50.8
1979	3,979,200	2,946,900	1,426,700	1,520,200	1,935,800	1,140,800	795,000	65.7	80.0	52.3
1980	4,132,200	3,061,000	1,479,700	1,581,200	1,984,600	1,157,200	827,400	64.8	78.2	52.3
1981	4,229,300	3,128,100	1,511,000	1,617,100	1,996,800	1,158,300	838,500	63.8	76.7	51.9
1982	4,276,500	3,166,500	1,530,300	1,636,100	2,024,500	1,160,700	863,700	63.9	75.8	52.8
1983	4,307,200	3,193,200	1,541,600	1,651,600	2,068,400	1,174,300	894,100	64.8	76.2	54.1
1984	4,354,100	3,234,100	1,561,100	1,672,900	2,050,400	1,169,300	881,100	63.4	74.9	52.7
1985	4,415,800	3,282,600	1,584,800	1,697,900	2,090,400	1,181,800	908,600	63.7	74.6	53.5
1986	4,462,200	3,330,300	1,608,900	1,721,400	2,198,500	1,220,700	977,800	66.0	75.9	56.8
1987	4,527,100	3,388,600	1,637,100	1,751,500	2,257,500	1,234,400	1,023,200	66.6	75.4	58.4
1988	4,616,900	3,454,300	1,667,800	1,786,500	2,315,800	1,247,100	1,068,700	67.0	74.8	59.8
1989	4,728,100	3,537,000	1,708,400	1,828,600	2,450,900	1,356,000	1,094,900	69.3	79.4	59.9
1990	4,866,700	3,636,300	1,761,500	1,874,800	2,532,300	1,398,900	1,133,400	69.6	79.4	60.5
FORECAST										
1995	5,429,900	4,017,200	1,956,200	2,061,000	2,797,200	1,521,900	1,275,300	69.6	77.8	61.9
2000	5,849,900	4,376,100	2,139,000	2,237,100	3,117,200	1,672,300	1,445,000	71.2	78.2	64.6
2005	6,291,800	4,763,000	2,335,800	2,427,200	3,359,900	1,796,200	1,563,700	70.5	76.9	64.4
2010	6,693,300	5,133,200	2,523,800	2,609,400	3,565,100	1,886,200	1,678,900	69.5	74.7	64.3
2015	7,142,100	5,478,700	2,698,100	2,780,600	3,708,200	1,963,600	1,744,500	67.7	72.8	62.7
2020	7,610,100	5,822,200	2,869,700	2,952,500	3,809,100	2,017,700	1,791,400	65.4	70.3	60.7

Notes:

Total population is based on the November 1995 official Office of Financial Management population estimate and forecast.

Total population estimates and forecasts are for April 1st of each year.

The projection of civilian non-institutional population is based on the 1990 proportion of the male and female Washington population participating in the military or residing in prisons, nursing homes, and other institutions.

Labor force participation rates represent the proportion of the civilian non-institutional labor force that is employed or unemployed based on federal Bureau of Labor Statistics definitions.

BEST COPY AVAILABLE

The "New Labor Force"

Changes in labor force participation combined with demographic changes (births, deaths, aging, and migration), will alter the profile of the Washington labor force. Between 1990 and 2020, the number of workers over 55 years old will increase by about 158 percent, while those aged 16 to 54 will increase by only 37.2 percent. (See Table II-1.) As a result, the profile of the labor force in 2020 will be very different from that in 1990. Older persons (55 years old and over) in the labor force is projected to represent about 18.7 percent of all workers in 2020, a significant increase from the 10.9 percent share in 1990. Other factors contributing to the "new labor force" are the increasing number of women and non-white participants.

Aging, Female, and Non-White Workforce

Before 2020, however, the workforce will go through a "middle-aging" process, bulging at the center around the year 2000, with middle aged workers — those 35-54 years old — rising to over one half of the labor force. A by-product of the middle-aging of the labor force is generational crowding or "mid-career crunch." The sharp rise of workers in the 35-54 year old group by the year 2000 will lead to an abundant supply of qualified persons for mid-career promotional opportunities. This, in turn, may result in the acceleration of job and career changes.

The "middle-aging" phenomenon may be further exacerbated by the "delayering" of management and aggressive cost cutting, as many larger firms seek to become more competitive in the global economy. In the current business cycle, the flattening or compressing of management structures in these firms has eliminated large numbers of mid-management positions. The widespread cost-cutting, which in the past meant mostly a reduction of production workers and blue-collar jobs, has also significantly affected management and white-collar jobs in recent years.

Along with an overall slowdown in labor force growth, and the expected increase of older workers and women in the labor force, non-whites will constitute an increasing share of the labor force in succeeding decades. Labor force growth rates for African Americans, Asians, and Hispanics is expected to be considerably higher than the rate for white population.

The result of higher labor force growth rates for non-whites relative to whites is indicated by the changing composition of the overall labor force over time. In 1980, 6.2 percent of the Washington labor force was non-white. In 1990, 10.3 percent of the labor force was non-white. In future years, non whites are expected to constitute 14.6 percent of the state's labor force by the year 2000, 16.3 percent by 2005, and 18.1 percent by 2010. Table II-4 shows the changing racial composition of the state labor force.

The main reason for the increased share of non-whites in the labor force is that the non-white population is expected to grow at a much higher rate than the white. A second reason is the younger age composition of the non-white population compared to whites. In addition to having higher proportions of people who will reach working age (and fewer who will reach retirement age) over the next 25 years, non-whites are also expected to increase their *rates* of labor force participation.

Table II-4
Labor Force Composition by Race, Washington

Year	Total Labor Force (1000s)	Percent of Total*			
		White	African American	Asian & Other	Total Non-White
1990	2,532.3	89.7%	2.7%	7.6%	10.3%
1995	2,797.2	87.2%	3.0%	9.7%	12.8%
2000	3,117.2	85.4%	3.3%	11.3%	14.6%
2005	3,359.9	83.7%	3.6%	12.7%	16.3%
2010	3,565.1	81.9%	3.8%	14.3%	18.1%

* Source: Washington Trends: 1995 Long-term Economic and Labor Force Forecast; Office of Financial Management, June 1995.

The labor force will also become increasingly more Hispanic over time. Again, this is due both to the higher proportion of Hispanics who will reach working age and fewer who will reach retirement age between 1990 and 2010, and to the fact that Hispanics are expected to increase their *rates* of labor force participation.

Challenges of the Changing Workforce

The aging of the workforce will provide unique challenges to employers. Businesses will need management and personnel practices that can effectively accommodate older employees. Among the challenges they face are: (a) establishing new reward and incentive structures as traditional hierarchical promotional opportunities decline; (b) facilitating career or job changes for "topped-out" employees; (c) meeting increased salary and benefit costs; (d) dealing with increased pressures on retirement systems; and (e) making work more varied and challenging.

III.

Long-Term Forecast of Washington Wage & Salary Employment

The labor market terms used in this chapter have precise definitions. It is useful to distinguish among the different concepts at the outset.

The **Labor Force** consists of the employed and the unemployed. It includes only non-institutionalized civilians 16 years of age and older. **Total Employment** is the number of employed persons, including those self-employed and persons working in agricultural jobs. Total employment excludes non-civilian military personnel. The **Unemployed** represent the number of persons in a given month who are not working and are seeking work, as indicated by unemployment insurance claims and responses to the Current Population Survey. **Non-Agricultural Wage and Salary Employment** describes the number of jobs by place of work in non-agricultural industries in a given month reported by firms in the monthly Current Employment Statistics industry survey. The survey numbers are then extrapolated to produce an estimate of total industry employment. Non-agricultural wage and salary employment was about 91 percent of total employment in 1994.

Long-Term Employment Trends

There are three important factors affecting long-term employment trends. One factor is the evolution of the indigenous labor force through births, deaths, and aging. A second is the long-term level of unemployment The third important factor is the change in the size of the available labor force due to net migration (the difference between workers leaving and entering the state). Growth of the labor force due to net migration, in turn, depends heavily on the strength of the state economy relative to the rest of the nation.

The long-term labor force forecast reflects these factors by relying upon a population forecast which is driven by natural change (births, deaths, and aging) and net migration, as influenced by the expected long-term performance of the Washington economy. Based on these factors, the Washington labor force is forecast to increase by about 1,250,000 workers between 1990 and 2020. (See Table III-1).

At any given time, however, a certain percentage of the labor force is unemployed. Since 1970, the Washington unemployment rate has ranged from a low of 4.9 percent in 1990 to a high of 12.1 percent in 1982. For the most part, the Washington unemployment rate has tracked closely

Table III-1
Washington Labor Force and Employment

Year	Labor Force	Total Employment	Unemployed	Unemployment Rate	Total Non-Agricultural Wage & Salary Employment
1970	1,417,100	1,285,900	131,200	9.3%	1,080,500
1971	1,401,100	1,259,200	141,900	10.1%	1,065,100
1972	1,433,600	1,296,900	136,700	9.5%	1,100,000
1973	1,483,800	1,366,800	117,100	7.9%	1,152,100
1974	1,528,700	1,419,800	108,900	7.1%	1,199,000
1975	1,562,200	1,412,200	149,900	9.6%	1,225,500
1976	1,621,400	1,481,100	140,300	8.7%	1,282,900
1977	1,692,300	1,544,200	148,200	8.8%	1,366,800
1978	1,807,800	1,684,100	123,700	6.8%	1,485,500
1979	1,935,800	1,805,600	130,300	6.7%	1,581,100
1980	1,984,600	1,828,200	156,400	7.9%	1,609,000
1981	1,996,800	1,806,000	190,800	9.6%	1,612,000
1982	2,024,500	1,778,900	245,600	12.1%	1,568,800
1983	2,068,400	1,837,700	230,700	11.2%	1,586,000
1984	2,050,400	1,856,900	193,600	9.4%	1,659,700
1985	2,090,400	1,920,700	169,600	8.1%	1,710,300
1986	2,198,500	2,017,800	180,700	8.2%	1,769,900
1987	2,257,500	2,086,800	170,700	7.6%	1,851,500
1988	2,315,800	2,172,800	142,900	6.2%	1,941,100
1989	2,450,900	2,299,600	151,300	6.2%	2,046,300
1990	2,532,300	2,409,000	123,300	4.9%	2,142,400
1991	2,533,700	2,374,100	160,800	6.3%	2,177,400
1992	2,643,600	2,444,800	198,800	7.5%	2,221,900
1993	2,698,800	2,495,500	203,300	7.5%	2,251,700
1994	2,707,400	2,534,000	173,400	6.4%	2,307,500
Forecast					
1995	2,797,200	2,623,000	174,200	6.2%	2,363,000
2000	3,117,200	2,929,200	188,000	6.0%	2,694,700
2005	3,359,900	3,155,600	204,300	6.1%	2,927,000
2010	3,565,100	3,344,700	220,400	6.2%	3,123,900
2015	3,708,200	3,474,600	233,600	6.3%	3,267,500
2020	3,809,100	3,582,300	226,800	6.0%	3,393,300
Change					
1970-1980	567,500	542,300	---	---	528,500
1980-1990	547,700	580,800	---	---	533,400
1990-2000	584,900	520,200	---	---	552,300
2000-2010	447,900	415,500	---	---	429,200
2010-2020	244,000	237,600	---	---	269,400
Growth Rates					
1970-1980	3.4	3.6	---	---	4.1
1980-1990	2.5	2.8	---	---	2.9
1990-2000	2.1	2.0	---	---	2.3
2000-2010	1.4	1.3	---	---	1.5
2010-2020	0.7	0.7	---	---	0.8

with the U.S. business cycle and unemployment rate, but at a level averaging about 1.5 percentage points above the national rate. The Washington rate has been about 2 to 4 percentage points above the U.S. rate during most economic downturns but much closer to the U.S. rate during recoveries and expansions. Over the last ten years, however, the Washington unemployment rate has fallen close to the U.S. unemployment rate. From 1985 to 1995 the average difference between the Washington unemployment rate and the U.S. unemployment rate has averaged about one half of one percentage point.

Based mainly on these factors, the Washington unemployment rate is expected to hover around 6.2 percent or about 0.1 to 0.5 percentage points above the U.S. rate after 1997. Underlying this forecast is the assumption that the trends and factors that closed the gap between the U.S. and Washington unemployment rates will continue into the forecast period. The long-term labor force and unemployment rate forecasts combine to yield a forecast of total Washington employment by the year 2020 of 3.58 million, an increase of about 1,048,000 employed persons compared to 1994, as shown in Figure III-1.

Since much of the historical data on employment by industry is based on the concept of non-agricultural wage and salary employment, rather than total employment, a forecast of non-agricultural employment is a necessary step in forecasting employment by industry. Historically, non-agricultural wage and salary employment has been about 85 percent of total employment. Due in part to a rising rate of multiple job holding, the ratio rose to nearly 92 percent in the 1990s. However, the U.S. ratio is two percentage points higher and predicted to rise to almost 97 percent by the end of the forecast period. The forecast predicts that Washington's ratio will also continue to rise, but not as fast as the U.S. ratio. By the year 2020 the Washington rate exceeds 94 percent in the forecast. On this basis, total non-agricultural wage and salary employment is forecast to reach 2.69 million in the year 2000 and 3.39 million in 2020, compared to 2.31 million in 1994. This represents an average annual growth rate of 2.3 percent from 1990 to 2000, 1.5 percent between 2000 and 2010 and 0.8 percent from 2010 to 2020. This forecast is reported in Figure III-1. A more detailed, sector-by-sector forecast of wage and salary employment is shown in Figure III-2.

Goods Producing Employment

Basic manufacturing will maintain a vital presence in the Washington economy over the next 25 years. Strong growth in capital investment for productivity enhancements both nationally and internationally will generate accelerating demand for much of the output of Washington's high-tech manufacturing sectors, as indicated in Figure III-2. In addition, long-term demand for Washington's natural resource products will continue to grow as both the national and international economies expand.

However, internal efficiencies and technological changes leading to gains in productivity will serve to hold employment growth in check. Some of the gains in output per worker will be market driven, arising out of increased competition in a world economy. Others will be dictated

Table III-2
Washington Non-Agricultural Wage and Salary Employment by Industry

	Actuals							Forecast						Average Annual Growth Rates				
Industry	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020	1960-1980	1980-1990	1990-2000	2000-2010	2010-2020
Manufacturing /1	216,700	226,900	239,500	244,000	308,800	295,600	369,400	336,700	357,300	369,000	372,800	375,200	378,900	1.8	1.8	-0.3	0.4	0.2
Nondurable mfg	70,800	71,000	74,500	75,000	87,600	90,600	108,400	108,900	115,300	120,600	124,500	126,800	128,000	1.1	2.2	0.6	0.8	0.3
Food & kindred prod	27,100	26,200	29,000	29,000	32,000	31,100	37,600	42,100	44,600	46,400	48,000	48,700	48,600	0.8	1.6	1.7	0.7	0.1
Apparel	3,700	4,500	5,500	6,300	6,500	6,200	7,900	9,100	9,100	9,200	9,300	9,300	9,400	2.9	2.0	1.4	0.2	0.1
Paper & allied prod	17,900	19,800	19,800	16,500	17,600	16,700	18,100	17,400	17,600	17,700	17,700	17,800	17,800	-0.1	0.3	-0.3	0.1	0.1
Printing	8,700	9,200	10,600	11,600	15,800	17,600	22,500	24,000	26,200	28,100	29,500	30,200	30,900	3.0	3.6	1.5	1.2	0.5
Chemicals /1	10,600	8,500	5,900	6,300	8,700	11,300	13,200	5,500	5,700	6,000	6,000	6,100	6,200	---	---	---	0.5	0.3
Miscellaneous nondur	2,800	2,800	3,700	5,300	7,000	7,600	9,000	10,800	12,200	13,200	14,000	14,600	15,200	4.7	2.5	3.1	1.4	0.8
Durable Manufacturing	145,900	155,900	165,000	169,000	221,200	205,000	260,900	227,800	242,000	248,400	248,300	248,400	250,900	2.1	1.7	-0.7	0.3	0.1
Lumber	44,500	46,900	42,200	47,100	47,000	38,300	39,900	35,100	35,700	35,500	33,700	32,300	31,600	0.3	-1.6	-1.1	-0.6	-0.6
Furniture	2,900	2,800	3,500	2,700	3,300	3,800	4,100	3,800	4,000	4,200	4,400	4,400	4,500	0.6	2.2	-0.2	1.0	0.2
Stone, clay & glass	5,000	5,400	5,800	6,100	6,900	6,400	7,900	9,100	8,700	9,200	9,700	10,200	10,900	1.6	1.4	1.0	1.1	1.2
Primary metals	10,200	11,700	14,100	14,700	16,700	12,700	13,000	11,000	10,000	9,700	9,200	8,900	8,400	2.5	-2.5	-2.6	-0.8	-0.9
Fabricated metals	6,700	6,900	7,400	10,100	11,700	9,700	12,200	13,200	14,000	14,500	15,300	16,400	18,000	2.8	0.4	1.4	0.9	1.6
Non-electrical mach	5,700	8,600	10,000	12,500	15,000	17,100	20,500	21,900	24,700	27,000	29,100	30,500	32,500	5.0	3.2	1.9	1.7	1.1
Electrical machinery	2,700	2,800	4,100	5,900	11,200	12,100	11,400	13,600	15,900	18,500	20,300	20,700	20,400	7.4	0.2	3.4	2.5	0.0
Aerospace	57,800	57,000	61,500	50,300	79,600	76,100	116,200	83,900	92,400	93,400	90,300	88,600	88,100	1.6	3.9	-2.3	-0.2	-0.2
Other transport equip	7,800	11,600	13,300	13,800	18,700	13,500	14,800	14,800	15,200	14,800	14,500	14,200	14,100	4.5	-2.3	0.3	-0.5	-0.3
Instruments	---	---	---	---	---	---	14,700	12,900	13,200	13,000	12,800	12,800	12,700	---	---	-1.1	-0.3	-0.1
Miscellaneous mfg	2,600	2,200	3,100	5,600	11,000	15,200	6,100	7,700	8,300	8,700	9,000	9,400	9,700	7.5	-5.7	3.1	0.8	0.8
Mining	1,800	1,800	1,700	2,000	3,200	2,700	3,700	3,400	3,800	4,000	4,100	4,100	4,200	2.9	1.5	0.3	0.8	0.2
Construction	44,600	46,200	53,400	59,500	92,900	80,400	117,300	124,000	132,700	141,200	145,200	149,100	151,000	3.7	2.4	1.2	0.9	0.4
Transport , comm & utils	61,300	61,700	72,200	72,500	91,400	93,600	113,000	120,900	132,500	136,300	140,100	141,900	143,000	2.0	2.1	1.6	0.6	0.2
Retail trade	126,500	142,900	176,300	206,100	280,800	314,900	392,900	441,500	507,300	553,400	597,700	617,600	634,700	4.1	3.4	2.6	1.7	0.6
Wholesale trade	53,600	55,900	64,600	79,500	100,600	105,700	128,500	144,900	162,200	173,500	182,100	186,100	188,500	3.2	2.5	2.4	1.2	0.3
Finance, insur & real esta	38,300	44,400	58,400	65,000	91,800	99,600	115,500	122,100	132,000	139,900	146,000	149,100	150,300	4.5	2.3	1.3	1.0	0.3
Services	103,500	123,400	169,700	216,600	308,500	375,000	504,300	628,000	773,700	886,400	985,600	1,071,900	1,152,900	5.6	5.0	4.4	2.5	1.6
Business services	---	---	---	---	---	---	146,200	187,100	233,800	279,400	330,300	377,000	420,600	---	---	4.8	3.5	2.4
State & local government	115,900	140,500	186,500	219,600	263,000	272,800	323,900	375,900	427,200	459,100	486,200	508,700	526,000	4.2	2.1	2.8	1.3	0.8
Federal government	50,700	52,600	58,100	60,800	67,900	70,100	73,700	68,600	62,600	61,200	60,800	60,600	60,400	1.5	0.8	-1.6	-0.3	-0.1
Total	812,900	896,400	1,080,500	1,225,500	1,609,000	1,710,300	2,142,400	2,363,000	2,694,700	2,927,000	3,123,900	3,267,500	3,393,300	3.5	2.9	2.3	1.5	0.8
Goods Producing	263,100	274,900	294,600	305,500	404,900	378,700	490,400	464,100	493,800	514,200	522,100	528,400	534,100	2.2	1.9	0.1	0.6	0.2
Non-Goods Producing	549,800	621,500	785,900	920,000	1,204,100	1,331,600	1,652,000	1,898,900	2,200,900	2,412,800	2,601,800	2,739,100	2,859,200	4.0	3.2	2.9	1.7	0.9

1/ Break in series after 1990 due to transfer of a portion of Hanford employment from chemicals (SIC 2819) to commercial physical research (SIC 8731)

BEST COPY AVAILABLE

Table III-3
Percentage Share of Total Non-Agricultural Wage & Salary Employment

Industry	Percent Share - Actuals							Percent Share - Forecast					
	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
Manufacturing /1	26.7	25.3	22.2	19.9	19.2	17.3	17.2	14.2	13.3	12.6	11.9	11.5	11.2
Nondurable manufacturing	8.7	7.9	6.9	6.1	5.4	5.3	5.1	4.6	4.3	4.1	4.0	3.9	3.8
Food & kindred products	3.3	2.9	2.7	2.4	2.0	1.8	1.8	1.8	1.7	1.6	1.5	1.5	1.4
Paper & allied products	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3
Apparel	2.2	2.2	1.8	1.3	1.1	1.0	0.8	0.7	0.7	0.6	0.6	0.5	0.5
Printing	1.1	1.0	1.0	0.9	1.0	1.0	1.1	1.0	1.0	1.0	0.9	0.9	0.9
Chemicals /1	1.3	0.9	0.5	0.5	0.5	0.7	0.6	0.2	0.2	0.2	0.2	0.2	0.2
Miscellaneous nondurables	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.4
Durable Manufacturing	17.9	17.4	15.3	13.8	13.7	12.0	12.2	9.6	9.0	8.5	7.9	7.6	7.4
Lumber	5.5	5.2	3.9	3.8	2.9	2.2	1.9	1.5	1.3	1.2	1.1	1.0	0.9
Furniture	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
Stone, clay, glass & cement	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3
Primary metals	1.3	1.3	1.3	1.2	1.0	0.7	0.6	0.5	0.4	0.3	0.3	0.3	0.2
Fabricated metals	0.8	0.8	0.7	0.8	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5
Non-electrical machinery	0.7	1.0	0.9	1.0	0.9	1.0	1.0	0.9	0.9	0.9	0.9	0.9	1.0
Electrical machinery	0.3	0.3	0.4	0.5	0.7	0.7	0.5	0.6	0.6	0.6	0.6	0.6	0.6
Aerospace	7.1	6.4	5.7	4.1	4.9	4.4	5.4	3.6	3.4	3.2	2.9	2.7	2.6
Other transportation equipme	1.0	1.3	1.2	1.1	1.2	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4
Instruments	---	---	---	---	---	---	0.7	0.5	0.5	0.4	0.4	0.4	0.4
Miscellaneous manufacturing	0.3	0.2	0.3	0.5	0.7	0.9	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Mining	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Construction	5.5	5.2	4.9	4.9	5.8	4.7	5.5	5.2	4.9	4.8	4.6	4.6	4.4
Transport., comm. & public utilit	7.5	6.9	6.7	5.9	5.7	5.5	5.3	5.1	4.9	4.7	4.5	4.3	4.2
Retail trade	15.6	15.9	16.3	16.8	17.5	18.4	18.3	18.7	18.8	18.9	19.1	18.9	18.7
Wholesale trade	6.6	6.2	6.0	6.5	6.3	6.2	6.0	6.1	6.0	5.9	5.8	5.7	5.6
Finance, insurance & real estate	4.7	5.0	5.4	5.3	5.7	5.8	5.4	5.2	4.9	4.8	4.7	4.6	4.4
Services	12.7	13.8	15.7	17.7	19.2	21.9	23.5	26.6	28.7	30.3	31.6	32.8	34.0
Business services	---	---	---	---	---	---	6.8	7.9	8.7	9.5	10.6	11.5	12.4
State & local government	14.3	15.7	17.3	17.9	16.3	16.0	15.1	15.9	15.9	15.7	15.6	15.6	15.5
Federal government	6.2	5.9	5.4	5.0	4.2	4.1	3.4	2.9	2.3	2.1	1.9	1.9	1.8
Goods Producing	32.4	30.7	27.3	24.9	25.2	22.1	22.9	19.6	18.3	17.6	16.7	16.2	15.7
Non-Goods Producing	67.6	69.3	72.7	75.1	74.8	77.9	77.1	80.4	81.7	82.4	83.3	83.8	84.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/ Break in series after 1990 due to transfer of a portion of Hanford employment from chemicals (SIC 2819) to commercial physical research (SIC 8731).

out of necessity in adapting to a more slowly growing labor force and, in some cases, scarcer available raw materials. In either case, the drive for greater efficiencies will act to constrain overall employment increases in the goods producing sectors within a narrow band averaging 0.6 percent annually between 1995 and 2020, as shown in the forecast detail in Figure III-2.

The national economy, in contrast, is expected to lose employment in manufacturing throughout the forecast period. Even a gain in the number of construction workers will not be sufficient to turn the tide. Washington will certainly share the national outlook for slower growth in population and employment in the future. But statewide manufacturing will expand at a pace greater than the national average owing to the disproportionate concentration of capital goods production in Washington's primary export base.

The need for vast investment in plant and equipment, particularly among developing nations, is destined to accelerate through the balance of this century. Accordingly, growth in machinery and electronics will set the tempo of Washington's manufacturing advance both in the short and long-run. Aerospace employment bottomed out in 1995 and has started to build in response to an up-turn in commercial orders. Further down-sizing in lumber and wood products and primary metals will be offset by positive job growth in the rest of manufacturing from 1995 to 2020.

Lumber and Wood Products

Jobs in lumber and wood products are expected to decline in both absolute and relative terms throughout most of the forecast period. This is basically a continuation of the long-term trend extending back to the end of World War II. In 1947, the lumber and wood products industry employed 58,800 workers and accounted for 8.9 percent of all non-farm jobs and 34 percent of all manufacturing jobs. In 1995, employment stood at 36,100 workers and the shares had fallen to 1.5 percent and 10.8 percent, respectively. By 2020, lumber employment should total 31,600 workers representing 0.9 percent of total nonfarm jobs and 8.3 percent of manufacturing.

The nature of the industry has changed dramatically in the post-war period and will undoubtedly continue to change in the future. As with other goods-producing sectors, greater worker productivity has been a major factor behind a shrinking lumber and wood products employment base. Increased capital investment and newer logging and milling technology has lowered the need for workers for each measure of output.

In the last decade a significant shift occurred on the supply side of the equation. In the late-1980s, heightened demand for environmental and wildlife protection effectively removed a sizable portion of the available supply of raw material from production. Federally owned forests managed by the U.S. Forest Service, were the focus of legal and regulatory efforts to comply with the Endangered Species Act. These measures were designed to protect the habitat of the Northern Spotted Owl, the Marbled Murlett, and riparian zones for various species of salmon.

It is assumed that lumber and wood products will continue to be affected by environmental constraints. These pressures are likely to force accelerated investment in resource-saving and labor-saving technology. Higher material costs and competition from alternative building

materials (steel, composites, etc.) will place added emphasis on offsetting internal efficiencies including wages and benefits. These factors all point to a declining demand for labor.

Paper and Allied Products

Employment in paper and allied products is essentially flat through the forecast period. The number of jobs in the industry will be little changed at 17,800, down from a high of 18,100 in 1990. However, in relative terms, the employment share in paper will drop from 5.2 percent of manufacturing employment in 1994 to 4.7 percent in 2020. Gains in productivity will enable output to climb while at the same time holding employment basically constant.

Many of the same forces affecting lumber and wood products carry over to the pulp and paper side of the equation as well. Environmental laws have had similar repercussions inasmuch as the byproducts of the one constitute the inputs to the other. To its advantage, the paper industry is somewhat more flexible than lumber regarding sources of supply. Chips can be imported. Recycled paper can also be used. Many paper establishments already process a significant amount of recycled materials; something the lumber sector has not yet been able to do.

The paper industry is also more capital intensive than the lumber industry. Environmental demands may result in accelerated investment in resource-saving and pollution abatement technologies. These technologies will not necessarily change the labor content of production. However, it is assumed these investments will enhance the industry's viability in the region.

Aerospace

The forecast calls for increased aerospace employment. Restructuring of engineering and administrative staff over the last several years is viewed as a concerted effort to enhance overall operating efficiencies. Greater cost control within the industry is being driven by pressures on operating margins as Boeing competes head-on with Airbus Industries and other major foreign producers.

Long-range demand is positive. Boeing is predicting demand for new passenger jets growing 5.2 percent a year on average over the next two decades. A total of 14,000 new jets worth $980 billion is envisioned, requiring output of 700 planes a year by the world's commercial aircraft manufacturers — twice the current rate of production. A quarter of demand is expected to emanate from replacement aircraft because of fuel inefficiency, excessive noise, or sheer obsolescence. The remaining three quarters will be generated by new growth in air travel, particularly in the Asia-Pacific Rim area. Two- thirds of all new aircraft deliveries are expected to go to carriers outside the U.S.

Growth of aerospace employment will be limited in the future by several significant factors. One major factor is foreign competition, particularly from Airbus. There is also the potential for added competition in the medium to long-term from Russia and in the long-run from Japan. The second factor is productivity. To meet the challenge of foreign competition, Boeing recognizes that productivity of its workers must continue to increase sharply. Higher productivity means that

large numbers of new workers will not be needed to produce proportionately higher levels of output. And, third, in order to gain new aircraft orders from foreign carriers, Boeing will likely continue to outsource some components to manufacturers in the foreign carriers home country. On the one hand, the latter practice appears to limit employment growth in Washington; however, if new aircraft orders are contingent upon outsourcing, then the practice may also prevent the loss of market share (and jobs) to Airbus and other manufacturers.

Other Transportation Equipment

Washington's transportation equipment production other than aerospace consists of shipbuilding, boat building, and the manufacture of other vehicles (primarily heavy trucks and trailers). Each segment of this industry faces very different market forces and prospects. The major shipyards will be hard pressed to maintain current levels of operation although some degree of reprieve has come from work on the recent Washington ferry contracts. Luxury yachts and other pleasure craft can be expected to moved in tandem with the general economy. On the plus side, sales of heavy trucks and trailers can be expected to increase over time in tandem with the growth in capital investment at home and abroad.

Primary Metals

Washington's primary metals industry is dominated by aluminum smelting and refining. The availability of cheap, abundant, and reliable power essential in the electrolytic reduction process has long been a factor in siting aluminum facilities in the region. Energy represents about 30 percent of aluminum production costs.

The region's aluminum producers enjoyed a distinct competitive advantage with respect to costs until a big electric rate increase hit in 1979. To resolve the problem, the Bonneville Power Administration (BPA) agreed to tie power rate changes to the prevailing world price of finished aluminum and to participate in new plant and equipment investments to enhance overall operating efficiencies. This largely restored the industry's competitive position during periods of high demand.

Several unsettling factors have affected the picture in the early 1990s. World production exceeded demand, and sales were being supported only by international agreement to address weakened market conditions. Russian dumping on the open market in 1992-93 caused prices to fall precipitously and mandated strong action. Demand strengthened in 1994-95 and some idled capacity was put back on line.

The price and availability of electricity plays a significant role in determining the future of aluminum production in Washington. Aluminum producers will see more competition for electricity from residential, commercial and other manufacturing consumers. Some of the results of increased demand on the region's limited supplies of electricity have already been felt by the industry. In late 1993 the BPA reduced by a quarter the amount of power available to aluminum producers and raised the price of electricity by 20 to 25 percent. The future is somewhat uncertain regarding future power supplies for the aluminum industry. Primary aluminum's variable

rate schedule negotiated with the BPA is set to expire in 1996. At this point, it is not known whether it will be renegotiated. If it is, it will reflect the realities of a situation where the demand for electrical power is growing faster than its supply.

Employment in primary metals is expected to gradually taper off throughout the forecast period. This basically continues the pattern of the past decade-and-a-half although the decline is expected to be somewhat sharper in the outlying years. The assumption is that higher costs of inputs will cause some reshuffling within the industry over time. On the plus side, Australian-based BHP Steel is building a new $221 million, 230-worker steel rolling mill in Kalama, scheduled to open in mid-1997.

Machinery and Instruments

Growth of Washington's machinery and instruments sector has led the economy over the past 20 years and will continue to do so for the foreseeable future. Combined employment in electrical and non-electrical machinery and instruments manufacturing has risen at a robust 5 percent average annual pace since 1970 — almost twice that of the total economy. Of particular note has been the explosive growth in electronics and scientific and medical instruments. The forecast assumes a 50 percent increase in machinery and instruments employment by 2020.

Markets for computer hardware are expected to remain strong throughout the forecast period. The need for business at all levels to increase productivity mandates the application of computer technology as an integral part of the daily work environment. The use of computers in schools and homes is also becoming commonplace. Key attributes of the state in attracting and retaining high-technology manufacturing are likely to remain positive given the thrust of state and local economic development efforts. One case in point is the new giant Intel plant going in at Du Pont in Pierce County with an expected employment of 6,000 by the year 2000. Another example is the expansion of SEH America's silicon wafer manufacturing facility in Vancouver. This expansion will create another 600 jobs. Matsushita is also planning an expansion of its computer chip manufacturing facility in Puyallup, adding another 100 to 300 jobs there.

Non-electrical machinery production is keyed largely to farm, construction, forest products, and other heavy industry. The outlook for this sector is as bright as that of the electronics industry. Overall investment levels are expected to continue strong. At the same time, new markets in Europe, Asia, and Latin America are strong possibilities in the long run given the emerging trend toward greater industrialized economies.

Agriculture and Food Processing

The diversity of Washington's farm production is expected to remain unchanged throughout the balance of this century. As long as a significant portion of Washington's crops — notably fruits, berries, and vegetables — are grown for fresh markets, the need for significant farm labor will continue to be strong. Increased mechanization, use of biotechnology, and additional information transfer will characterize the industry over the long run. But in contrast to sharp declines

projected nationally, employment in Washington's farm sector should remain positive with gradual increases in food processing employment as well.

Crop production will continue to be the dominate force owing to the economic importance of the state's fruit and vegetable harvests. Long-range prospects for processing fruits, vegetables and specialty products look very strong. Increase in one and two person households and the ever rising participation of women in the workforce are positive factors affecting the demand for processed foods. Also, persons 65 years and older will be increasing at rates more than twice that of the total population. This will also boost the demand for convenience foods.
Foreign exports are expected to constitute ever larger proportions of total sales over the long run. Both fresh and processed markets are being affected. Significant inroads have already been made for Washington-produced apples, potatoes, and other fruits and vegetables. Niche markets will play increasingly important roles. And the opening of economies in both Europe and Asia to free trade will provide additional inroads.

Construction

In the short-term the demand for construction and construction activity can be very volatile. Demand is highly sensitive to interest rates and the business cycle. In addition, large public works projects can also have a powerful short-term influence over the construction sector. In the long-term, however, construction demand is primarily a function of population and employment growth. Population growth mainly determines the demand for residential housing. Employment growth is related primarily to commercial and non-residential construction. In spite of its many short-term ups and downs, however, the long-term average level of construction employment relative to total employment has actually been quite stable.

Over the past 30 years, construction employment has been about 5.2 percent of total non-agricultural employment, with fluctuations during boom and bust periods. The lowest ratio of construction employment to total employment during the past 30 years was 4.7 percent, occurring on several occasions during economic slowdowns. The highest level of this ratio was 6.6 percent in 1979, when an economic boom was underway and the Washington Public Power Supply System had five nuclear power plants under construction.

Toward the end of the decade of the 1980s Washington experienced strong population growth, mainly due to in-migration, and strong economic growth relative to the U.S. and most other states. This stimulated construction employment growth to 2.4 percent over the decade. That rate of growth is not expected to continue in the long-term. Throughout the forecast period population growth is predicted to decline gradually. Likewise, the rate of growth of employment is forecast to fall gradually. These two factors suggest that both the residential and non-residential demand for construction employment will decline over the forecast period.. Some of the decline will be offset by rising incomes and the subsequent demand for more expensive housing and for remodeling.

It is expected that construction employment will maintain its share of overall employment. By 2000, construction employment will comprise about 5.0 percent of total nonagricultural wage and

salary employment, slightly less than the historical proportion of 5.2 percent. In 2020 it is forecast to be about 4.6 percent of wage and salary employment.

Non-Goods Producing Employment

The relationship between goods producing industries and non-goods producing sectors has changed dramatically over the past 20 years. Increased productivity has slowed the pace of job growth in the goods producing sectors, while heightened demand for consumer services and products among the rising number of dual wage earning families has accelerated job growth in services, retail trade, and other non-manufacturing sectors. In 1960, goods-producing jobs represented almost one-third of total non-agricultural wage and salary employment. In 1994, this figure dropped to about 20 percent. It is expected to decline further in the forecast to less than 17 percent by 2020. (See Figure III-3).

Transportation, Communication, and Utilities (TCU)

Over the past 30 years, the share of total non-agricultural employment represented by TCU has steadily declined from 7.5 percent to 5.1 percent in 1994. Much of this is due to technological advances in industries such as trucking, shipping, air transportation, and telecommunications. These advances have greatly increased the productivity of workers in these industries, which has made possible large increases in output without a corresponding increase in employment.

In recent years, the deregulation of most TCU industries has resulted in further productivity gains. The forecast calls for the benefits of further technological improvements, especially in communications, to result in a continuation of the decline of TCU as a share of total employment. This share is expected to decline slightly to 4.9 percent in 2000 and then gradually decline to 4.5 percent in 2010 and 4.2 percent in 2020.

Wholesale Trade

Although the function of the wholesale trade sector is selling merchandise to retailers (or other wholesalers), wholesale trade employment has grown at a substantially slower rate than retail trade employment over the past 30 years. This primarily reflects technological advances and improved business methods such as computerization, improved inventory controls, and better systems of distribution and delivery. Further productivity and management improvements of this nature are expected, and it is therefore predicted that wholesale trade employment will grow at about the same rate as total employment in the decade of 1990 to 2000, even though retail trade employment is expected to grow at a faster rate. In the ensuing decade, wholesale trade employment growth is predicted to grow at an even slower rate compared to total employment and retail employment. During the span of 2010 to 2020, wholesale trade is forecast to grow at half the rate of retail trade.

Retail Trade

Employment in retail trade has increased as a percentage of total employment over the past 30 years, primarily reflecting increases in income and spending power during that period. During the 1960s and 1970s, the growth of income came from increases in wages and increased labor force participation by women. In the 1980s, when little or no growth of real wages occurred, spending power still increased but primarily as a result of the continued growth in the labor force participation rate of women. In addition to providing higher household income, increases in the number of two income households reduced the time available for preparation of meals at home, further fueling growth of eating and drinking places, the largest and fastest growing retail trade subsector.

The forecast calls for retail trade employment to continue to increase as a percentage of total employment through the end of the century, but at a slower rate than in the past. Future wage increases are not expected to match those of the 1960s and 1970s, and because there are now already many women in the labor force, the growth of two income households is expected to slow. Therefore, because increases in income are expected to be slower in the next 20 years than was the case between 1960 and 1990, slower growth of retail trade employment is also expected.

Other trends in retail trade will also act to limit employment growth in that sector. Increasing worker productivity and economies of scale generated by "warehouse"-type superstores will continue to offset employment growth to some extent. The forecast indicates that retail trade employment as a proportion of total wage and salary employment will end up in 2020 at about the same proportion as in 1995.

Finance, Insurance, and Real Estate (FIRE)

Historically, employment in FIRE has grown slightly faster than total wage and salary employment, reflecting the growing population and increasing real personal income. In the first half of the 1990s this trend seemed to hold despite advances in productivity and a shift toward electronic banking. In Washington, the number of branch banks expanded rapidly during the 1990s, somewhat offsetting the trend toward increased productivity. The boom in mortgage refinancing and the expansion of the number and kinds of services that banks provide also helped to keep employment growth up. However, the refinancing boom ended in 1995 with the rise in mortgage interest rates and it also appears that another round of consolidation is beginning. For the decade of the 1990s these trends indicate that employment in FIRE will grow, but more slowly than wage and salary employment.

In the next decade employment in FIRE will continue to grow at a slower rate than wage and salary employment. Major restructuring and consolidation of the banking industry will slow employment growth in FIRE into the next century. Computerization and other advances in this industry will increase growth in output per worker. In terms of job growth, these productivity increases will offset to a large degree the increases in demand for FIRE services. Trends toward electronic banking and interstate banking should also work to constrain growth in employment in this sector.

Services

Services have been the fastest growing sector of the economy in recent years, a trend that is expected to continue during the forecast period.

Basic services, including legal services, business services, and engineering, management and accounting services, accounts for almost 30 percent of total services employment. This group of services has been the fastest growing within the services division, and is predicted to lead this division in the future. Growth in basic services is the result of numerous factors, including the trend by businesses away from using in-house staff for functions such as advertising and data processing, and the contracting out of this work with specialized service firms. The ever-increasing complexity of the legal and data processing fields has made it less and less practical for firms to do this work in-house.

Another major factor in the growth of business services has been the increased use of temporary personnel to perform specialized work or to meet peak periods of demand. As a result, there has been rapid growth in employment at temporary help and employment agencies. The growth of the prepackaged software industry is another important component of the forecast of business services. Within Washington, the Microsoft Corporation is the largest firm in this industry.
Although other services will not grow as fast as basic services, they will continue to grow faster than total wage and salary employment. Like the basic services, **health services** have grown at a faster than average rate in recent years.. Future growth, however, is expected to be only slightly above average. Historical increases in health services employment reflect an ever increasing commitment of society's resources to health care. However, it is now clear that further large increases in the proportion of national income spent on health care are unlikely. Although the aging of the population during the forecast period will result in above average growth of health services, cost pressures will limit this growth.

Personal and repair services will probably be the weakest of the service subsectors, while hotels, amusement and recreation, education, social, engineering, accounting, and management services will be relatively strong..

State and Local Government

Education has historically been the major function of state and local government. State and local government employment grew faster than total employment between 1958 and 1972 as the baby boom generation moved through the educational system. Recently, there has been a strong increase in the number of young school-age children, but this growth is expected to abate in the second half of the 1990s. An increase in the college age student population, however, is expected to add employment in public higher education.

In state government there are important factors that are likely to lower the growth of government employment. The first is passage of Initiative 601 in 1993. This measure limits the growth of spending by tying spending to the growth of population and inflation. The second is a general

sentiment across the nation that government has grown too large. The past several years have seen a slow down in the growth of state government employment. This is expected to continue into the near future. Most of the growth will take place in local government employment. Overall, the proportion of total wage and salary employment represented by state and local government is forecast to gradually decline over the next 20 years.

Federal Government

Federal government employment has declined as a percentage of total employment throughout the post-World War II era, a trend which is expected to continue during the forecast period. Although some areas of federal government activity such as the postal service and park service can be expected to increase along with the population, Washington's large defense sector appears certain to be reduced in the long term. Defense related cutbacks make significant increases in federal government employment unlikely in the long term. In the near term, however, transfers of military personnel from California to Washington may boost federal government employment in Washington. However, these shifts will only offset declines in other areas of federal government employment. The net effect will be a decline in federal government employment through 2010. Significant structural changes in the federal government are assumed to be essentially completed by 2010 and federal government employment is expected to remain fairly stable from 2010 through 2020.

IV.

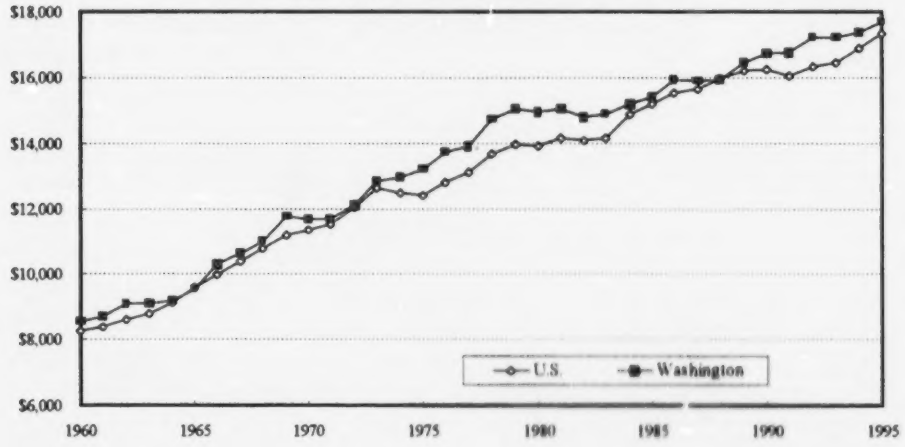
Long-Term Forecast of Washington Per Capita Personal Income

Trends in Washington per capita personal income reflect the pace of the state's economic growth. Whether Washington is a high or low per capita income state affects its population growth, poverty levels, the business climate, the quality of life, and the state's capacity to provide appropriate public services.

Estimation of real per capita income is derived by dividing total state personal income by total number of the state residents, then adjusting for inflation using the implicit price deflator for personal consumption (1987=1). Total personal income, as defined by the U.S. Bureau of Economic Analysis, includes income from labor earnings, interest, dividends, rent, and transfer payments.

In 1995, total real personal income in Washington State was estimated at 96.6 billion; about 68 percent of this amount came from labor earnings, 16 percent from asset incomes, and 16 percent from transfer payments. The estimated 1995 real per capita personal income for the state was $17,680, which was about 2 percent above the U.S. average of $17,330.

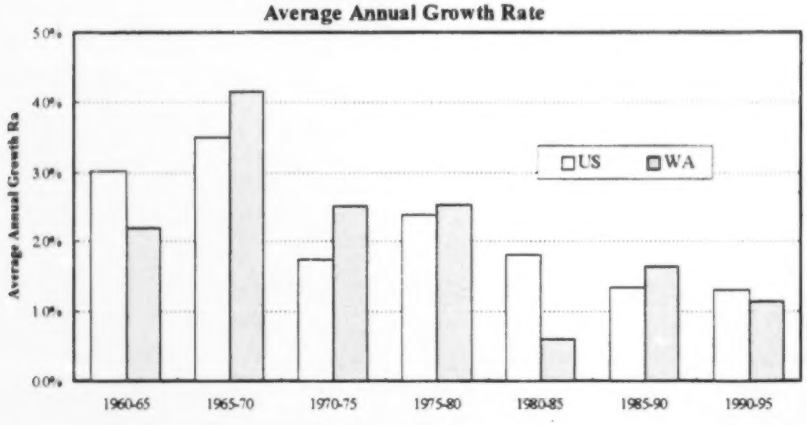
Figure IV-1
Real Per Capita Personal Income, 1987$



Trends in Per Capita Income

In the past three and a half decades, Washington State per capita personal income, in real terms, grew at an average annual rate of 2.1 percent. Growth in Washington per capita personal income fluctuates with the state's economic conditions. During most of the expansionary periods, state per capita personal income grew faster than the U.S. average. Conversely, per capita personal income growth in Washington State usually dropped below the national average during recessions or periods of slow economic growth. (Figure IV-2).

Figure IV-2
Real Per Capita Personal Income
Average Annual Growth Rate



Over the past 35 years, average annual increase in Washington real per capita personal income ranged from a low of 0.6 percent in the first half of the 1980s to a high of 4.5 percent during the 1965-70 period. Substantial growth in the state's aerospace industry, along with the industry's high wages and salaries, played a major role in income growth between 1965 and 1970. On the other hand, the 1981-83 national recession was particularly hard on the Washington economy. The state economy was hit severely and remained in recession for a longer period than the nation, resulting in the poor performance in per capita income growth.

Since the mid 1970s, growth in per capita personal income has slowed down at both the state and the national levels. For the nation, the most commonly cited reason is the slowdown in productivity growth. This factor also affected the earnings and income in the state. In addition, the state economy suffered from the collapse in non-oil commodities prices during the 1970s and early 1980s that hurt Washington's resource-based industries. Other contributing factors include the appreciation of the dollars in relation to foreign currencies in the first half of the 1980s that suppressed the output and employment growth of the state's export industries, and the rise in real interest rates in the 1980s that significantly cut back the demand for Washington's durable goods products.

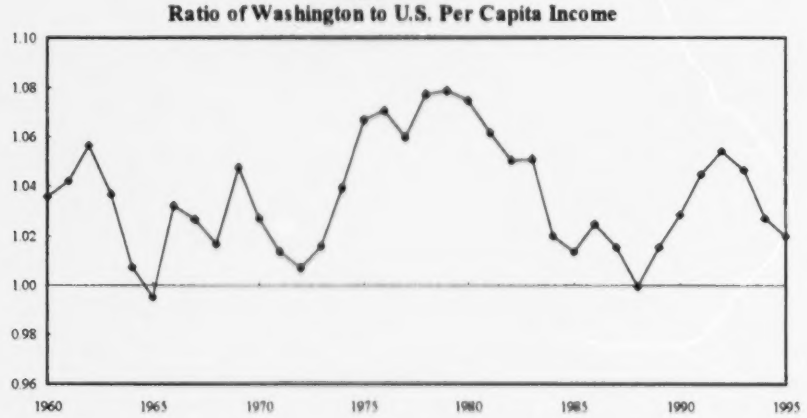
Two local incidents — the sudden termination of the Washington Public Power Supply System (WPPSS) construction project and waning of the region's shipbuilding sector — in the early 1980s exerted notable, negative effects on the growth of earnings in the state.

In the second half of the 1980s, the state economy experienced substantial job growth in aerospace and certain high-tech manufacturing sectors, and in the evolving high-wage "knowledge-based" services industries. As a result, real per capita personal income grew faster in the state than in the nation.

The state's economic growth was in full strength in 1990 when the U.S. economy was entering a recession, sustaining a level of state per capita income growth above the nation's. However, in 1991, the aerospace sector started cutting back production to accommodate the shrinking aircraft market. By 1993, the negative income effect of the aerospace reduction offset to a large extent the income growth brought about by other prospering sectors (e.g. machinery manufacturing and business services) in the state. The Washington economy in the past three years has been growing at a rate below the historical average, while at the same time the national economic recovery picked up pace. Per capita income growth in the state thus declined relative to the U.S. average during the period.

Different industry structures, business cycle patterns, labor market characteristics, and population profiles contribute to the difference in per capita personal income between Washington and the U.S. State per capita personal income as a percentage of the U.S. average fluctuated widely over the past 35 years, ranging from 0.995 (i.e. about 0.5 percent below the national average) in 1965 to a high of 1.078 (i.e. 7.8 percent above the national level) in 1979 (Figure IV-3). There was only one occasion when state per capita personal income fell below the national average; however, it lasted less than a year.

Figure IV-3
Ratio of Washington to U.S. Per Capita Income



Over the long run, per capita income in Washington has trended closely with the U.S. average. Between 1960 and 1995, per capita income in the state averaged 3.6 percent above the national level. However, the cyclical volatility of certain manufacturing and resources industries in the state periodically narrowed or widened the per capita income gaps between Washington and the

nation. These industries affected the state income level through the sheer amount of workers they employed, and the relatively high wages they paid. Over time, however, whatever the loss in state per capita income growth, relative to the nation, that Washington suffered during the economic downturns, it gained back in the subsequent expansions.

The Outlook for Washington Per Capita Income

Washington per capita personal income, in 1987 constant dollars, will increase 8.0 percent from $17,680 in 1995 to $19,100 by the year 2000 (Figure IV-5). This will result in a widening per capita income gap between Washington and the U.S. — from 2.0 percent in 1995 to 3.4 percent in 2000. By 2020, per capita income level in Washington will rise to $23,380, about 32.2 percent above the 1995 level, with the state-national difference narrowing somewhat to 3.1 percent. (Table IV-1 provides the details of the long term personal income forecast. An appendix to this chapter describes the model used in the personal income forecast).

Washington Compared to the U.S.

In the future, the Washington economy is expected to be more diversified with an industrial structure more similar to the nation's than in the past. These developments assure that the state will have relatively stable economic growth, and thus less volatile per capita income growth. But does this mean that the state's per capita income level will converge to the national average in the next three decades? The projection here suggests that Washington will still maintain a per capita personal income level 2.5 to 3.5 percent above the national average over the forecast horizon. Several factors contribute to this rather bright outlook for state personal income growth:

- The state's aerospace industry is moving into an expansionary phase in the second half of this decade; and, in the two decades after the year 2000, worldwide aircraft demand is expected to be strong.

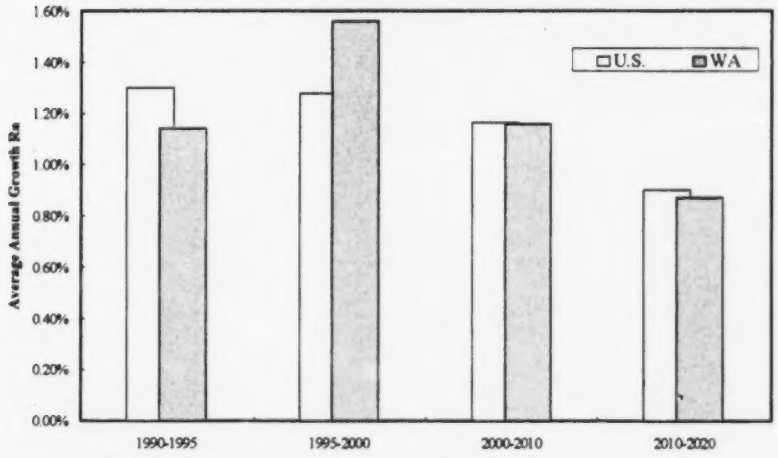
- The agriculture and food-processing industries in the state are expected to prosper in the next two decades; this is because the worldwide food market is expanding rapidly as a result of increasing consumption from rapidly-growing developing countries.

- A more integrated global economy will help expand state exports and stimulate export-related business activities.

- The expected macroeconomic trend toward lower and stable real interest rates in the future means that there will be a rising demand for the durable goods produced in the state, leading to the growth of high-wage employment in these industries.

- Recent business expansion and investment activities in the state suggest that the state will continue to attract and grow a variety of high-tech manufacturing and knowledge-based business services industries; the growth of high-earning jobs in these industries will help raise per capita income level for the state.

Figure IV-4
Growth of Real Per Capita Income, 1990-2020
(Average Annual Growth Rate)



Based on the above considerations, it is projected that annual per capita income growth in the state will significantly outpace the national average between 1995 and 2000, regaining the ground lost in the previous five years. After the year 2000, Washington per capita income will grow at about the same rate as in the nation as a whole. (Figure IV-4). However, due to the dramatic slow down in labor force growth, per capita income growth after the year 2000, for Washington and the U.S. will be lower than in each of the previous two decades. This trend of decelerating income growth is expected to continue through at least 2020.

Figure IV-5
Per Capita Personal Income Trends, 1995-2020

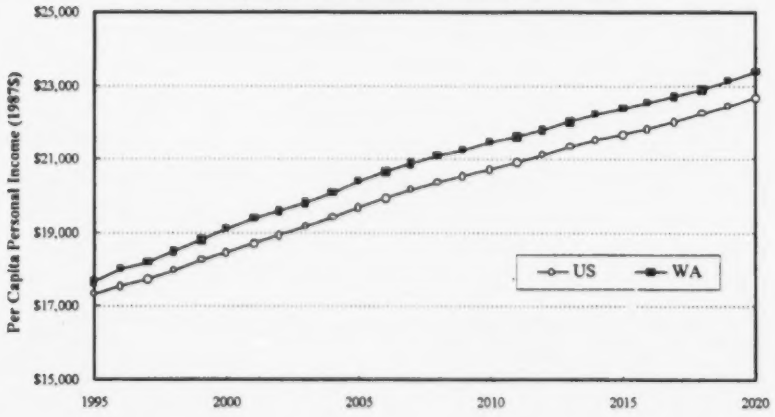


Table IV-1
Real Per Capita Income Trends, Washington and U.S.

Year	Washington Per Capita Income (1987$)	Change from Previous Year (%)	U.S. Per Capita Income (1987$)	Change from Previous Year (%)	WA/U.S. Ratio
1980	14,949		13,908		1.075
1981	15,025	0.50	14,153	1.76	1.062
1982	14,790	-1.56	14,083	-0.50	1.050
1983	14,882	0.62	14,164	0.57	1.051
1984	15,177	1.98	14,878	5.05	1.020
1985	15,409	1.53	15,209	2.22	1.013
1986	15,904	3.21	15,524	2.07	1.024
1987	15,876	-0.18	15,640	0.75	1.015
1988	15,929	0.34	15,941	1.93	0.999
1989	16,430	3.14	16,185	1.53	1.015
1990	16,708	1.69	16,250	0.40	1.028
1991	16,757	0.30	16,043	-1.28	1.045
1992	17,205	2.67	16,319	1.72	1.054
1993	17,193	-0.07	16,428	0.67	1.047
1994	17,344	0.88	16,892	2.82	1.027
1995	17,681	1.94	17,333	2.61	1.020
Forecast					
2000	19,101		18,469		1.034
2005	20,365		19,672		1.035
2010	21,433		20,733		1.034
2015	22,351		21,662		1.032
2020	23,378		22,681		1.031

Appendix: The Model

A regression model was developed to project Washington per capita personal income over the next 25 years. The independent variables, or the major determinants of the state personal income, were selected based upon observations of historical income trends in the state. Discussions of historical income trends in Washington in this chapter provide a basis for the variable identification and selection.

The model shows that Washington per capita personal income is heavily influenced by U.S. economic trends and usually moves in tandem with U.S. per capita personal income. The model also suggests that three other factors can cause Washington per capita personal income trends to depart significantly from the corresponding national trends:

- Factors which affect real interest rates, boosting or depressing production and employment in Washington's interest rate sensitive industries.
- Factors which affect employment in construction, aerospace, and lumber — three critical high wage sectors of the Washington economy.
- Factors which affect the hourly wages of Washington production workers relative to U.S. production workers.

Washington Long-Term Per Capita Personal Income (PCPI) Model

PCPI = -9497.762 + 1.118*USPCPI + 6711.004*WAGE - 161.784 RINTRT + 70.414*EMPSHAR

PCPI =	Washington per capita personal income, 1987 dollars.
USPCPI =	U.S. per capita personal income, 1987 dollars. (t = 38.67)
WAGE =	Washington average hourly manufacturing wage as a percentage of corresponding U.S. wage. (t = 6.77)
RINTRT* =	Real interest rate. (t = -6.19)
EMPSHAR =	Aerospace, lumber, and construction employment as a percent of total non-agricultural wage and salary employment. (t = 2.62)

* Real interest rate is defined as the AA utility bond rate minus the DRI's "expected inflation" estimate.

No. of observations: 36 (1960 - 1995)
Adjusted R-squared = 0.997873
Standard Error of regression = 127.012

SPECIAL REPORT

V.

Changes in Real Average Earnings in Washington: An Update to 1994

Between 1979 and 1988, Washington's real average earnings declined relative to the U.S., but began to rebound in 1988. In 1994 Washington real average earnings were almost equal to the U.S. figure. In this special report, the components of change in earnings are examined with the goal of understanding more about the performance of Washington relative to the U.S.

Past studies of the "earnings decline" focused on real average "wages" (rather than "earnings") in Washington. Wages only capture part of the changes in total compensation paid to employees. This study utilizes a broader definition of compensation by using real average earnings.

The definition and data for earnings are derived from the personal income data for the U.S. and Washington published by the Bureau of Economic Analysis, U.S. Department. of Commerce. Earnings as defined for the purposes of this chapter include not only wage and salary disbursements but also other labor income and proprietors' income. Other labor income consists of the contributions by employers to privately administered benefit plans for their employees. This includes pensions and profit-sharing plans, group health and life insurance, supplemental unemployment insurance, privately administered worker's compensation plans, directors' fees and other miscellaneous fees. While this definition of earnings does not include the value of all non-wage benefits, it is a much broader definition of total compensation than just wage and salary disbursements

Components of the Earnings Decline

In 1979, real average annual earnings in Washington were $22,581 (in 1987 dollars). By 1988, this figure had dropped by $2,039 to $20,541. During the same period, real average annual earnings in the U.S. increased slightly from $21,252 to $21,352, a gain of $100. In terms of percentage growth, Washington's real average earnings per worker declined by 9 percent while the real average earnings per worker in the U.S. increased by 0.5 percent. Real average earnings in Washington changed from 6.3 percent above the U.S. average in 1979 to 3.8 percent lower that the U.S. in 1988.

In 1989 this trend began to reverse itself. In 1994 real average earnings in 1987 dollars in Washington had grown to $21,794, a gain of $1,252 compared to 1988. Real average earnings in

the U.S. also increased, but only by $531. Over the period of 1988 to 1994 Washington average real earnings grew by 6.1 percent while the U.S. figure grew by 2.5 percent. In 1994 real average earnings in Washington and the U.S. were nearly the same..

Industry Composition

The analysis in this chapter separates changes in earnings into several components. The first component involves ***industry composition.*** Industry composition refers to how jobs are distributed among the industries of the Washington or U.S. economy. Changes in industry composition can have a significant impact on national and state economies. For instance, over the last century the economy of the U.S. has shifted from a primarily agrarian economy to one dominated by industrial production. Changes in industry composition affect average earnings because different industries have different earnings levels. A shift in employment from high wage industries like manufacturing and construction to lower wage industries like personal services and retail trade affects average wages and earnings.

Over the last two decades both the state and the nation have seen a dramatic change in industry composition. In both economies there has been a shift away from high paying manufacturing jobs toward lower paying retail trade and service jobs. This shift helped to slow the growth of real average earnings in the U.S., but it contributed to an actual decline in real average earnings in Washington.

Incidence of Part-Time Jobs

The second component of the earnings change is ***the percentage of employment that is in part-time status***. Since average earnings are computed by dividing employment (without concern for part-time or full-time status) into total earnings, an increase in the incidence of part time work would decrease average earnings. In addition, part-time workers typically earn less than full-time workers in the same industry. Part-time workers often receive no benefits or only partial non-wage benefits.. This lowers the earnings of part-time workers in relation to full-time workers.

Trends in part-time employment are also related to changes in industry composition. Manufacturing jobs tend to be full-time jobs. A much higher percentage of jobs in services and retail trade are part time jobs. The steady loss of high quality, "family wage" jobs has been accompanied by a rise in part-time employment, with the part-time jobs often held by second wage earners. While the entry of second wage earners in families may have helped to increase family and household incomes, it has also been a response to the decline in real average earnings per worker.

Changes in Earnings Within Industries

The third component of earnings change examined in this analysis is: ***changes in earnings within industry sectors***. Average earnings can change, for example, because high wage industry sectors lose jobs to low wage sectors; because of rapid growth in the number of lower wage part-time jobs; or simply because earnings are declining within industry sectors. As documented below, the

most important contributor to the change in real average earnings in Washington is this third component — change of earnings within industry sectors.

State versus National Factors

In addition to examining the contributions of industry composition, growth in part-time jobs, and earnings change within industries, this analysis also examines the relative contributions of state and national factors to changes in Washington's average earnings. For example, some changes in industry composition in Washington were based on national factors affecting all states, while other changes were due to factors peculiar to Washington. This study separates the "industry composition" component of the earnings decline further, into that part due to national factors and that part due to state conditions.

The mathematical method of breaking down the change in real average earnings is depicted in detail in Table V-3 at the end of this chapter.

Real Average Earnings Decline in Washington, 1979-1988

Washington real average earnings declined by $2,039 from 1979 to 1988. The contribution of each of the three components of change are shown in Table V-1. The first component, the change in industry composition, is responsible for about 27 percent of the total change. As the breakdown between national and state factors indicates, the change in Washington industry composition was strongly influenced by national trends during this period. Most of the change can be attributed to national trends in industry composition. Most of the employment growth in both Washington and the U.S. between 1979 and 1988 took place in the lower wage employment sectors, earnings, including services and retail trade.

Table V-1
Washington Real Average Earnings, 1979-1988
Components of Change

	Change in			
	Industry Composition	Incidence of Part-Time Work	Average Earnings Within Industies	**Total Change**
State Factors	($31)	($245)	($1,769)	($2,045)
National Factors	($517)	$37	$486	$6
Total	($549)	($207)	($1,283)	**($2,039)**

The second major component of change is the incidence of part-time work. There was a large difference in the growth rates of part-time work for Washington and the U.S. between 1979 and 1988. In 1979, Washington and the U.S. were fairly close in the incidence of part-time work. In

that year the proportion of Washington workers employed on a part-time basis represented 18.7 percent of total employment.. In the U.S. the proportion was 17.8 percent. Over the next 9 years, Washington's proportion of part-time employees increased more than for the U.S. By 1988 Washington had 21.5 percent of total employment in part-time jobs while the U.S. proportion was 18.7 percent. However, as Table V-1 indicates, this had a relatively small effect on the change in real average earnings in Washington. This component accounted for only about 10 percent of the total change in real average earnings.

The third and largest contributor to the earnings decline between 1979 and 1988 is the change in real average earnings within industries. Almost two-thirds of the decline in real average earnings in Washington can be attributed to this component of change. State factors made a very large negative contribution to this change, which was offset somewhat by positive national changes in average earnings within industries. From 1979 to 1988, real average earnings declined within virtually all sectors of the Washington economy.

Partial Rebound in Washington Real Average Earnings, 1988-1994

The divergence of growth trends in real average earnings between the U.S. and Washington reached its maximum in 1988. In 1979, real average earnings in Washington were 6.3 percent above U.S. real average earnings. By 1988 real average earnings in Washington were 3.8 percent below U.S. real average earnings. This situation began to change in 1989.

Table V-2
Washington Real Average Earnings, 1988-1994
Components of Change

	Change in			
	Industry Composition	Incidence of Part-Time Work	Average Earnings Within Industies	**Total Change**
State Factors	($29)	($57)	$919	$833
National Factors	($341)	$50	$710	$419
Total	($371)	($6)	$1,629	**$1,252**

As Table V-2 indicates, real average earnings in Washington rebounded somewhat by 1994. A significant negative contribution to average earnings in the period of 1988 to 1994 was made by changes in industry composition; however most of this was due to national factors..

The proportion of part-time workers in both the U.S. and Washington economies increased slightly from 1988 to 1994. The change in the incidence of part-time work produced only a negligible change in real average earnings in Washington. Here, national factors had a small

positive effect on average earnings in Washington while state factors had a slight downward impact.

As in the 1979-88 period, the biggest contributor to the change in Washington average earnings since 1988 was the change in average earnings within industries. In a reversal of the trend from 1979 to 1988, real average earnings in Washington grew in most sectors of the state economy and also exceeded those in the U.S. in most industry sectors. Washington real average earnings increased by $1,629 due to changes in this component. Of this total, $710 could be attributed to national factors and $919 to state factors.

Toward an Explanation of the Earnings Decline

Despite nearly 20 years of erosion in the real average earnings of U.S. and Washington workers, a generally accepted explanation of the causes of the earnings decline is still lacking. Analysis of census data and other more detailed information is required for a better understanding of the earnings decline. Based on aggregate level employment and earnings data presented here and similar data analyzed at the national level, the following factors appear to be associated with the decline in average earnings:

National Factors in the Change in Industry Composition, 1979-1988

During the 1980s, high paying jobs were lost as many U.S. manufacturing industries failed to keep pace with advances abroad in technology, organization, and management. The spread of advanced mass production technologies to countries with less skilled and lower wage workers, together with the mobility of monetary capital, also resulted in a shift of some production abroad.

Two monetary developments further eroded the base of high-paying production jobs. The enormous appreciation of the value of the dollar in relation to foreign currencies in the late 1970s and early 1980s made the cost of U.S. goods much higher abroad and the prices of foreign goods much lower at home. In addition, high real interest rates in the U.S. further depressed the demand for durable goods.

These circumstances exacerbated a long term decline in manufacturing jobs due to increases in worker productivity. For example, by the late 1980s, Washington's lumber and wood products industry was producing the same amount of lumber as in the late 1970s, with about one-third fewer workers. Although productivity gains resulted in fewer goods-producing jobs, increases in productivity were not strong enough to boost real wages.

State Factors in the Change in Industry Composition, 1979-1988

Special circumstances in Washington, including the termination of Washington Public Power Supply System (WPPSS) nuclear reactor construction, resulted in the loss of thousands of high-skill, high-wage construction jobs in the early 1980s.

National Factors in the Earnings Decline Within Industry Sectors, 1979-1988

In addition to job losses in high-wage sectors, real average wages declined in nearly all sectors of the Washington economy during the 1980s. The drop in real average wages was due to both changes in industry composition, and to declining real wages within industry sectors.

Strong productivity gains in goods-producing sectors, which had boosted real wages in the 30 years after World War II, slowed down considerably in the 1970s and 1980s. Competitive international pressures (exacerbated by a rising dollar) also forced businesses to reduce costs and hold down wages.

Real wage declines in manufacturing and construction spread to services, retail trade, and other secondary sectors. Wage increases for both Washington and U.S. workers were also held down by rising health care benefit costs.

State Factors in the Earnings Decline Within Industry Sectors, 1979-1988

Washington was particularly vulnerable to these national changes. The state economy began the 1980s with relatively high wages, strong labor unions, and dependence on several major manufacturing sectors increasingly subject to international competitive pressures. Competitive pressures from other regions of the country affecting major Washington sectors, such as lumber, ship-building, and aluminum, placed additional downward pressure on wages in Washington industries.

Table V-3
Decomposition of Average Earnings

	Change in Industry Composition	Change in Average Earnings Within Industries	Change In the Incidence of Part-Time Work	Total Change
State Factors	Sc	Sw	Spt	Stot=Sc+Sw+Spt
National Factors	Nc	Nw	Npt	Ntot=Nc+Nw+Npt
Total	Ctot=Sc+Nc	Wtot=Sw+Nw	PTtot=Spt+Npt	CHtot=Ctot+Wtot+PTtot

Ctot =

Σ[AVEARNfte79 *SHARE79*EMPtot79* PTpct79*0.5] + [AVEARNfte79*SHARE79*EMPtot79*(1-PTpct79)*1.0]/EMPtot79 -
Σ[AVEARNfte79 ***SHARE88*EMPtot88*** PTpct79*0.5] + [AVEARNfte79***SHARE88*EMPtot88***(1-PTpct79)*1.0]/**EMPtot88**

Nc =

Σ[AVEARNfte79 *SHARE79*EMPtot79* PTpct79*0.5] + [AVEARNfte79*SHARE79*EMPtot79*(1-PTpct79)*1.0]/EMPtot79
Σ[AVEARNfte79 ***NSHARE88*EMPtot88*** PTpct79*0.5] + [AVEARNfte79***NSHARE88*EMPtot88***(1-PTpct79)*1.0]/**EMPtot88**

Sc = Ctot-Nc

Wtot =

Σ[AVEARNfte79 *SHARE79*EMPtot79* PTpct79*0.5] + [AVEARNfte79*SHARE79*EMPtot79*(1-PTpct79)*1.0]/EMPtot79 -
Σ[**AVEARNfte88** *SHARE79***EMPtot88*** PTpct79*0.5] + [**AVEARNfte88***SHARE79***EMPtot88***(1-PTpct79)*1.0]/**EMPtot88**

Nw =

Σ[AVEARNfte79 *SHARE79*EMPtot79* PTpct79*0.5] + [AVEARNfte79*SHARE79*EMPtot79*(1-PTpct79)*1.0]/EMPtot79
Σ[**NAVEARNfte88** *SHARE79***EMPtot88*** PTpct79*0.5] + [**NAVEARNfte88***SHARE79***EMPtot88***(1-PTpct79)*1.0]/**EMPtot88**

Sw = Wtot-Nw

PTtot =

Σ[AVEARNfte79 *SHARE79*EMPtot79* PTpct79*0.5] + [AVEARNfte79*SHARE79*EMPtot79*(1-PTpct79)*1.0]/EMPtot79 -
Σ[AVEARNfte79 *SHARE79***EMPtot88* PTpct88***0.5] + [AVEARNfte79*SHARE79***EMPtot88*(1-PTpct88)***1.0]/**EMPtot88**

Npt =

Σ[AVEARNfte79 *SHARE79*EMPtot79* PTpct79*0.5] + [AVEARNfte79*SHARE79*EMPtot79*(1-PTpct79)*1.0]/EMPtot79
Σ[AVEARNfte79 *SHARE79***EMPtot88*NPTpct88***0.5] + [AVEARNfte79*SHARE79***EMPtot88***(1-NPTpct88)***1.0]/**EMPtot88**

Spt = PTtot-Npt

SPECIAL REPORT

VI.

Earnings Differences Among Washington Workers*

Previous earnings studies (including Chapter V) used annual Bureau of Economic Analysis (BEA) personal income and employment data to look at statewide and industry specific average earnings. These studies have been able to show broad trends in earnings and compare trends in individual states to the rest of the country.

The study in this chapter is an attempt to look more closely at the composition of earnings and their distribution among different types of workers. In order to match the earnings of individual workers with their demographic and personal characteristics, it was necessary to use census data. The 1980 and 1990 Public Use Microdata Sets (PUMS) were used to determine not only overall average earnings, but also the earnings, and the changes in earnings, of sub-groups of workers (by age, sex, race, education, industry etc.). By using the census data, a more detailed description of changes the state's economy can be made.

Since the source for the information in this chapter is different from that used in the previous chapter (BEA data based on reporting of wages by businesses versus self reported census data) there are differences in the magnitude of earnings estimates for particular points in time, as well as differences in the estimate of changes in earnings between time points. However the direction of change and the general relationships and trends estimated by each approach are similar.

Overview

Findings of the analysis of BEA personal income and employment are summarized below, followed by a series of charts illustrating the findings.

Overall Earnings Decline

From 1979 to 1989, the real (inflation adjusted) income of the average Washington worker declined by $896 from $28,722 to $27,826, a decrease of 3.1 percent. (Workers in this report are defined as those 20 to 64 years of age who worked at least 45 weeks during the previous year. The analysis in the previous chapter was based on all workers).

* David Schumacher, currently on the staff of the state Senate Ways and Means Committee, conducted the research and wrote the initial draft for this study.

Earnings Decline by Age and Education Group

The decrease in income did not fall on all workers equally. Young workers, those without college degrees and those with low incomes experienced large decreases in real income. While e older, better educated, higher income workers saw increases in real earnings.

Differences in Earnings Between Men and Women

The earnings difference between men and women decreased slightly between 1979 and 1989 as the income of women increased while that of men decreased. However, the average income of women was still substantially lower than that of men. Although the income of women increased by 9.0 percent and the income of men decreased by 3.4 percent, the overall decline was 3.1 percent. This anomaly is explained by the fact that more women were in the workforce in 1989 than in 1979. Thus, the overall average decreased for two reasons: (1) the earnings of men decreased and the proportion of women (at lower earnings levels) increased.

Differences by Racial Categories

Of the five racial categories shown, only the incomes of African Americans and Asians increased. However, the income level of African Americans was still much lower than that of either Whites or Asians. Native Americans and those in the "Other" category experienced the most largest decreases in income.

Differences by Education

Both the level of and change in income are shown to be quite dependent upon education. Not only did those with advanced degrees (MA, Ph.D. or professional degrees) earn more in 1979 than in 1989 in real terms, they were also the only group of workers to see increases in real income. Persons with a high school degree or less saw a sharp decline in earnings in 1989 compared to 1979. Persons with BAs also earned lower in real terms in 1989 than in 1979.

Differences by Industry Sector

Real earnings declined in each industrial sector except Financial, Insurance, Reál Estate (FIRE). Especially hard hit was the construction industry with the loss of high wage Washington Public Power Supply System (WPPSS) jobs and the natural resource based industries with the loss of timber jobs.

Figure VI-1
Average Annual Wages by Sex, 1979 & 1989

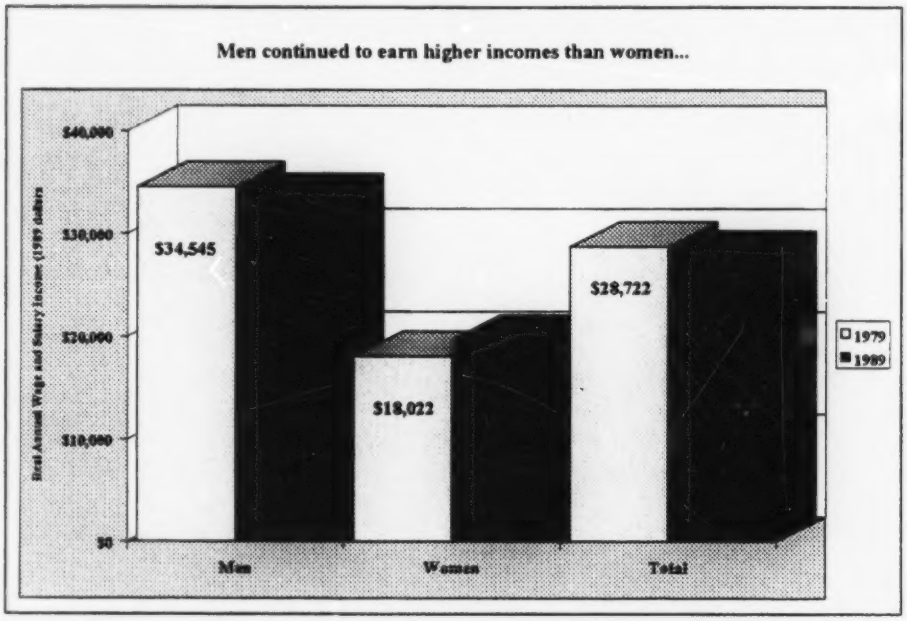


Figure VI-2
Wage Growth by Sex, 1979-1989

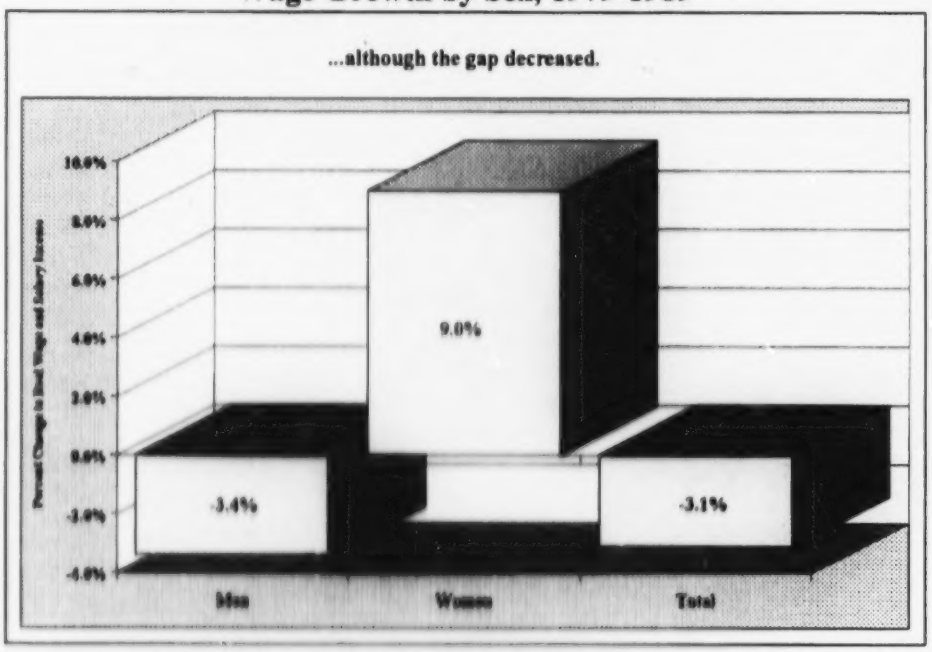


Figure VI-3
Average Annual Wages by Race, 1989

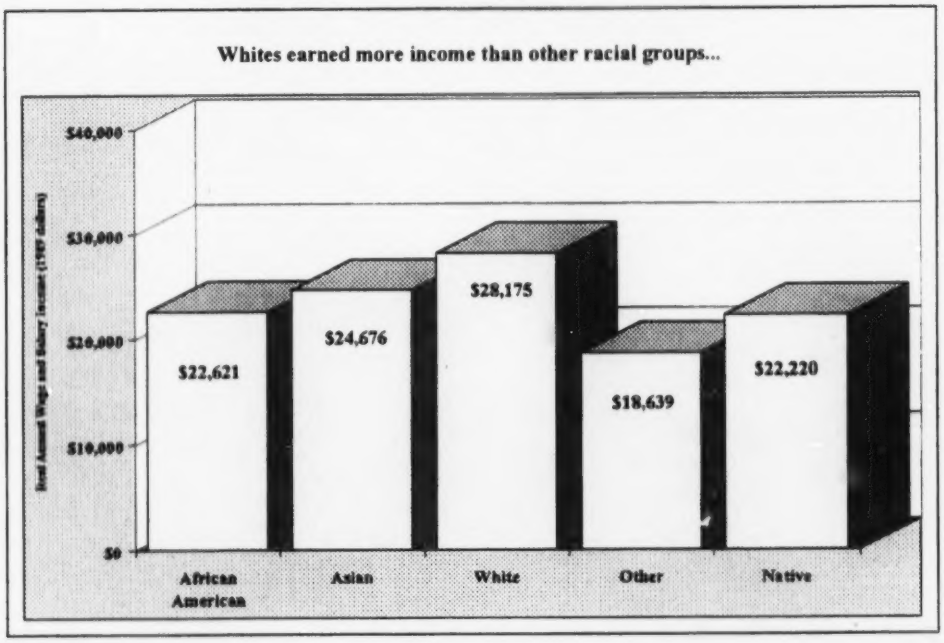


Figure VI-4
Wage Growth by Race, 1979-1989

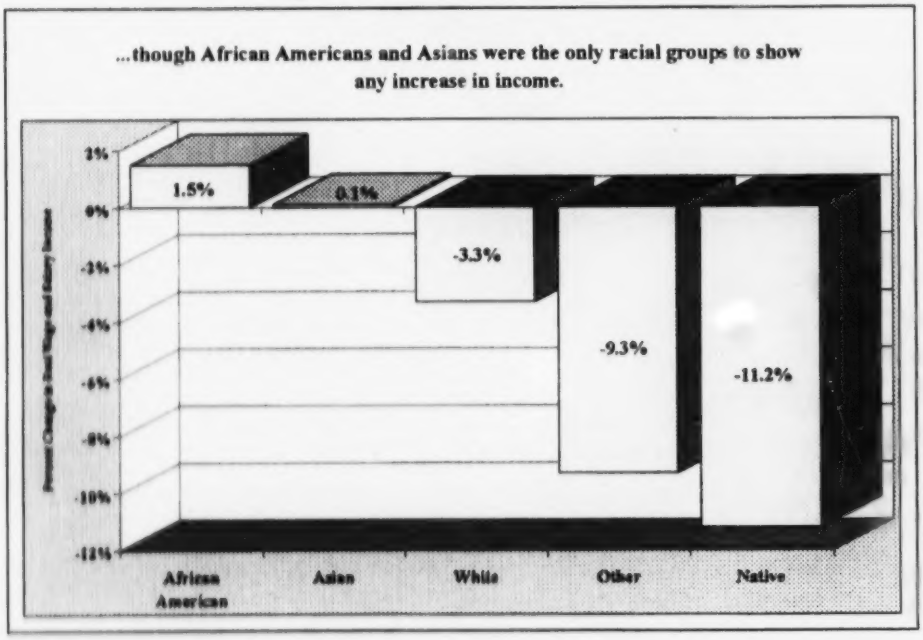


Figure VI-5
Average Annual Wages by Education Level, 1989

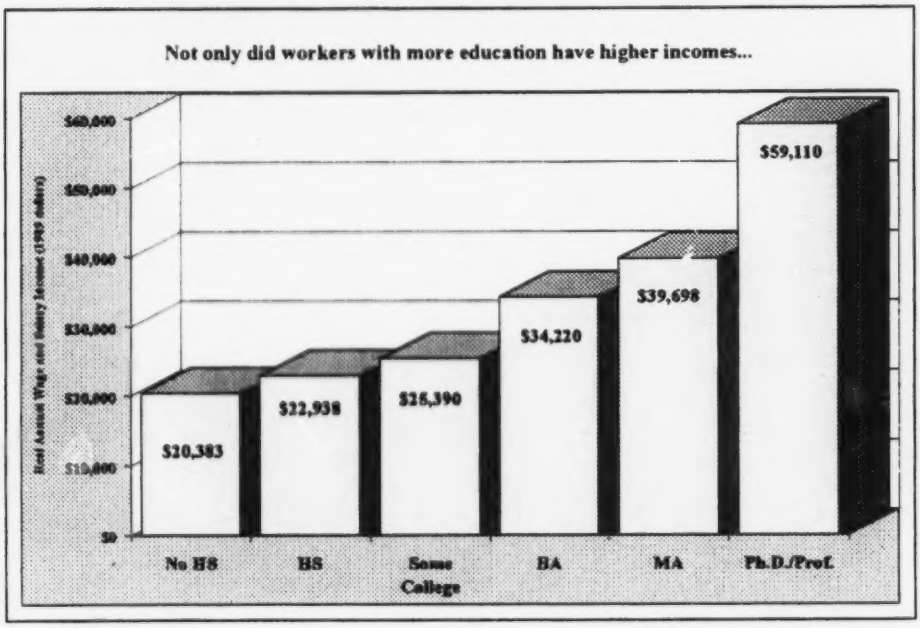


Figure VI-6
Wage Growth by Education Level, 1979-1989

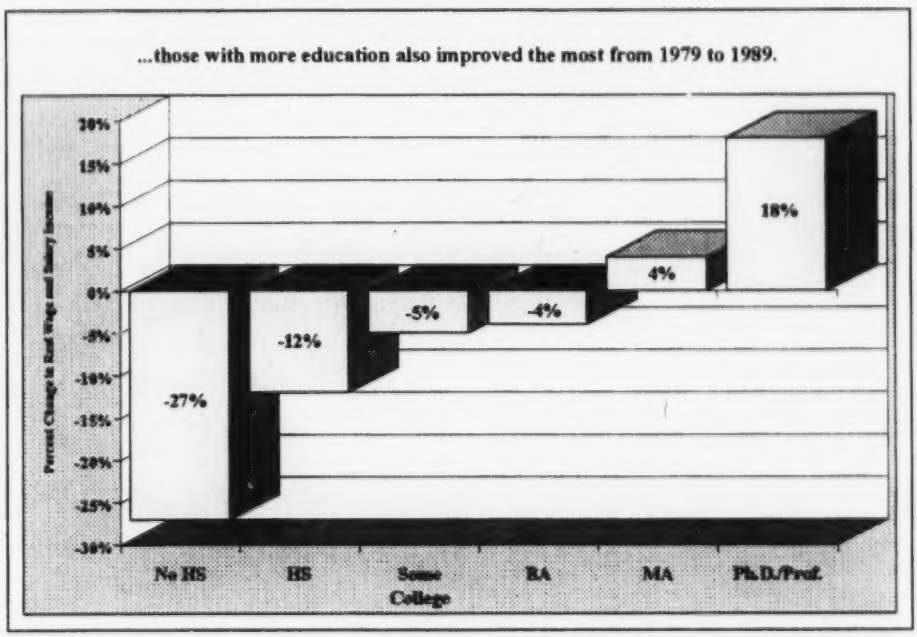


Figure VI-7
Average Annual Wages by Industry, 1989

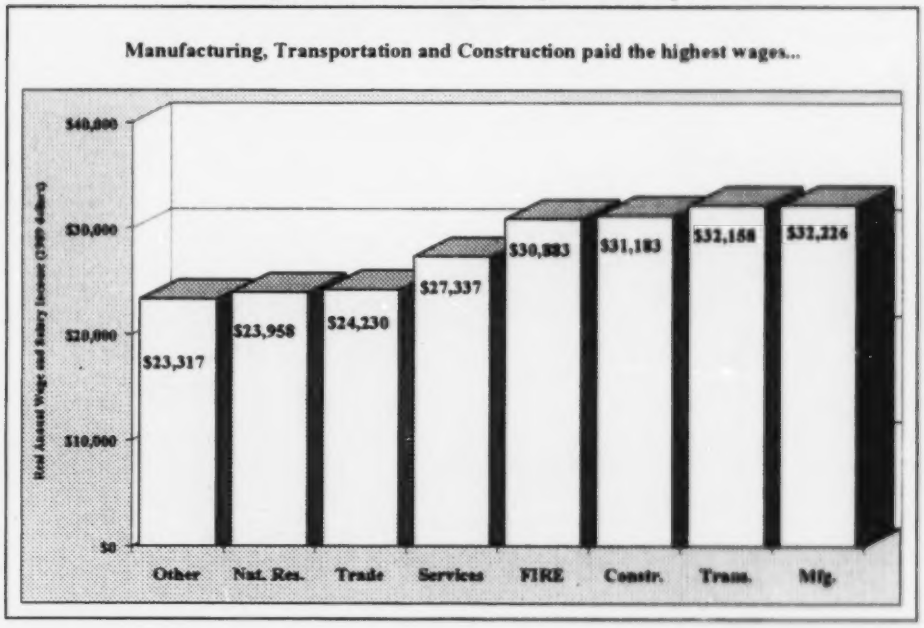


Figure VI-8
Wage Growth by Industry, 1979-1989

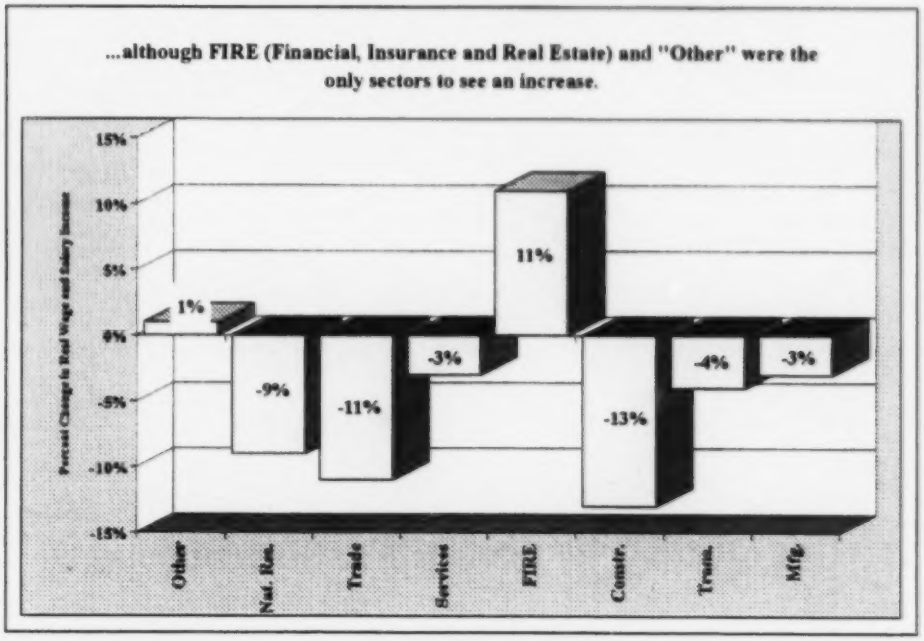


Figure VI-9
Average Annual Wages by Age Group, 1989

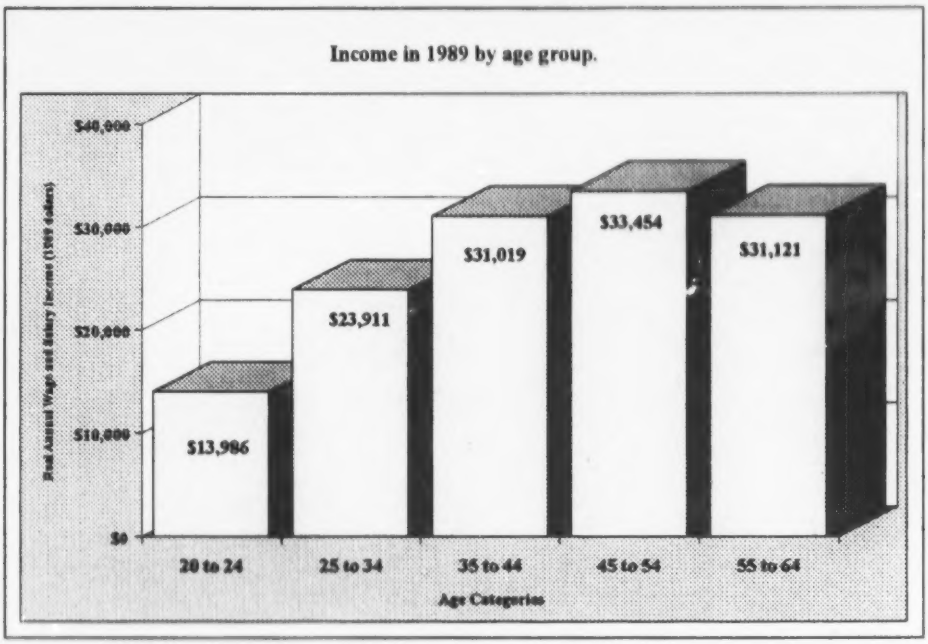


Figure VI-10
Wage Growth by Age Group, 1979-1989

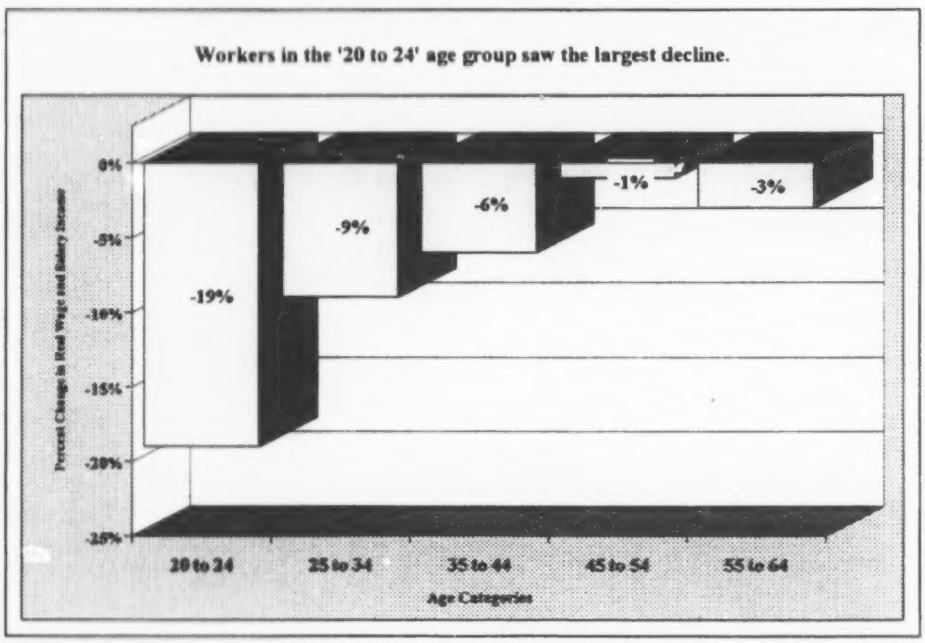


Figure VI-11
Average Annual Wages by Income Range, 1989

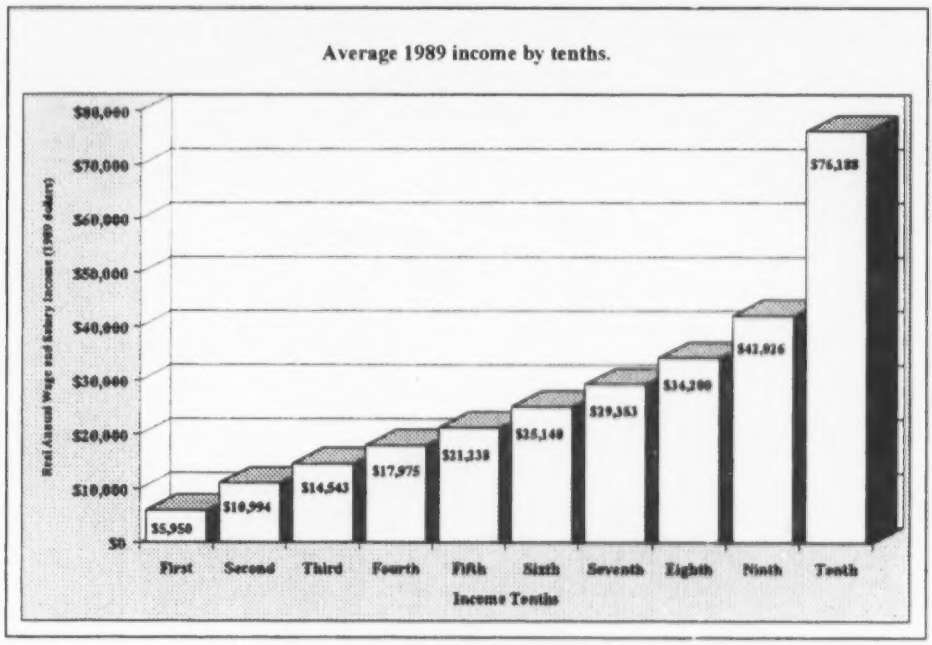
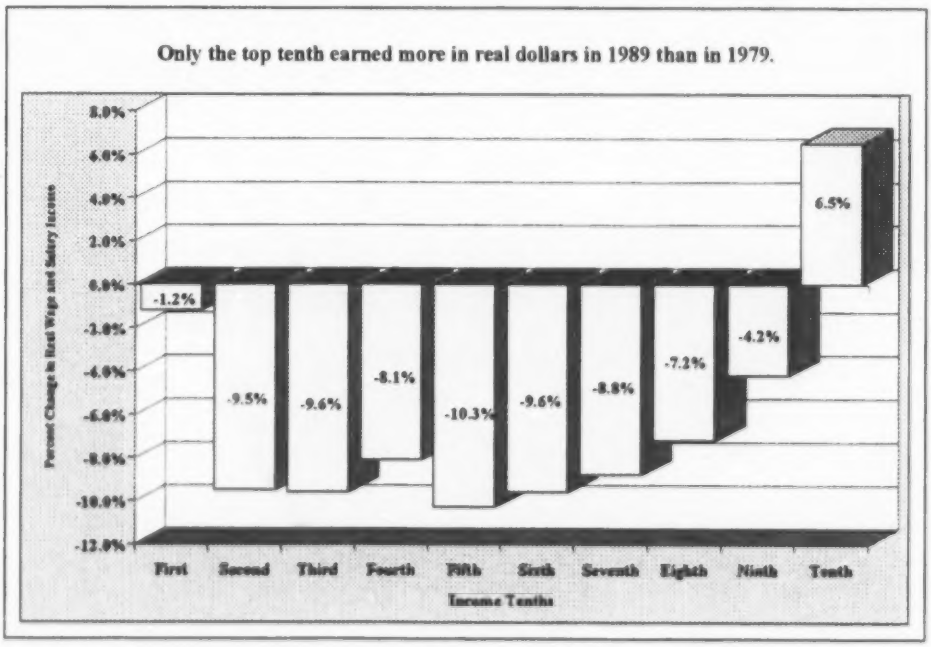


Figure VI-12
Wage Growth by Income Range, 1979-1989



Decline in Average Earnings

The decline in real average earnings growth over the past 25 years seems to be consistent with the decline in productivity that has occurred since the early 1970s. Productivity is a measure of how much input is required to produce goods and services in the economy or, put another way, how efficiently the economy is working. In the long run, the growth in real national income will roughly match the growth in its productivity. The reasons for the slowdown in productivity growth are not clearly understood. One reason often given is that productivity increases in the services sector have come more slowly than in manufacturing and other goods producing sectors, and since a larger share of the economy is in services, the overall productivity has declined.

It is also possible that the society as a whole has chosen to restrain growth in money income by imposing regulatory constraints upon businesses, thereby increasing non-monetary benefits such as clean air, clean water, and safer working conditions. Or it is also possible that workers are now receiving more non-earnings compensation for their work. For example, workers may be receiving more, or at least more expensive, health care benefits instead of higher earnings. Or perhaps a smaller share of the economic benefits generated by the economy are showing up as earnings. If a greater share of the increases in a nation's wealth are coming from interest and dividends, then the growth in earnings and salary income will be reduced.

The increase in the proportion of women (many with less experience) and lower skilled immigrants in the workforce is another reason often given for the decline. As workers with less experience or lower skills enter the workforce, often competing for lower earnings and lower skilled jobs, they will contribute to a surplus of labor for certain types of jobs and drive the earnings down for all workers competing for those jobs. The loss of high paying jobs to other countries through international trade is also often mentioned though it is more likely that these factors would change the distribution of income, rather than cause a decline in overall average in income growth.

Greater Inequality in Earnings

The other major trend that has become apparent since the 1970s is that the distribution of income has become less equal. For at least three decades prior to the mid 1970s, both growth and decline in earnings income have been distributed fairly evenly across all income groups. Low and high income categories, high school graduates and Ph.D.s, manufacturing workers and services workers saw similar percentage changes in their earnings. However, over the past 20 years, these relationships have changed. Higher income groups have done much better than lower income groups, even before the significant effects of tax code changes are considered. High skilled and highly educated workers have also done much better. It appears that the economy has not provided earnings growth for all workers, but has targeted it to specific types of workers.

One theory for the growing inequality is the loss of high earnings manufacturing jobs caused by international trade This loss has driven down the earnings in not only the manufacturing sector, but in other sectors as well, as laid off workers compete for jobs in other industries.

Another theory argues that since broad trends toward inequality are occurring across virtually all industry sectors, there must be a general increase in the demand for high-skilled workers (and a declining demand for low-skilled workers), with the dichotomy related, perhaps, to changes in technology.

Yet another theory looks at the supply-side of labor. It suggests that workers have had their bargaining power with employers reduced through various changes in the labor market. Less bargaining power sometimes translates into slower earnings growth or even lower earnings.

Effects of International Trade on Income

It is widely argued by economists that the total economic gains from international trade are larger than the economic losses; that in total, countries are better off with free trade than without it. However, the economic harm from trade to specific individuals or types of workers can be substantial. For example, when clothing produced by foreign workers is less expensive in this country, every consumer benefits to a small degree when they are able to spend a smaller portion of their income on clothing. But, some domestic clothing workers may have lost their jobs due to clothing imports. On the other hand, international trade is a driving force in the creation of high income jobs in certain sectors. For example, the ability of Boeing to sell aircraft throughout the world clearly has a positive effect on the income of Washington residents.

A commonly held theory predicts that international trade with "low-wage developing countries" will create winners and losers determined by skills and education of the workforce. This theory says that when the U.S. trades with countries with an abundant supply of "unskilled" labor, the U.S. will use its advantage in skilled labor to supply exports in high skill industries and allow the other country to supply the low skilled imports. The low skilled U.S. workers are faced with competition from workers in low earnings countries and are forced to take less in earnings and/or lose their jobs. It is the loss of the relatively high paying, "blue collar," jobs that helps account for the inequality in incomes.

However, the fact is that in non-traded industries and in many of our trading partner countries, similar patterns of winners and losers have developed. Also, a very small part of U.S. imports actually come from "low-wage countries." Studies have estimated that on average, workers in our trading partner countries earn 90 percent of the U.S. average. In addition, international trade is not a large enough component of the $7 trillion dollar U.S. economy to depress earnings across the entire economy. These points, and others, have led many economists to question the validity of a theory which places the main responsibility for income inequality on international trade and forced them to look for other possible explanations.

Declining Negotiating Strength of Workers

Another theory suggests that the loss in union strength has contributed to the slower earnings growth and growing income inequality. In the past, union manufacturing jobs were a source of relatively high earnings jobs for low skilled/less educated workers. As the influence of unions has diminished over time, the bargaining position of union workers has lessened. This means that a smaller share of a company's revenues will go to it's workers. In addition there has been a real decline in the minimum wage. As the real minimum wage has slowly fallen over time, business has been able to pay low skilled workers less. It is also argued that the minimum wage provides a floor for many low wage jobs and can affect the wages even of those workers whose wages are slightly above the minimum wage.

Demographics of the Baby Boom

As the post-war generation known as the "Baby Boomers" have aged and entered the labor force, the number and types of jobs necessary to fully employ this huge cohort of workers have not always been produced by the national economy. In addition, economic theory suggests that wages and compensation per worker should fall if the supply of labor is increasing faster than the demand for labor. Baby boomers were entering the U.S. labor force in increasingly larger numbers during the years of the early 1970s. This demographic trend would tend to slow the growth rate of wages and compensation. However, the Baby Boomers could conceivably have a positive effect on wages and income as they mature. As workers mature and gain more experience, skills and seniority their real wages and income tend to grow. If this life-cycle hypothesis of earnings and income hold true for Baby Boomers, then the real wages and income should increase at a faster pace as this cohort reaches its maximum life-cycle earnings in the 1990s and into the next decade. Of course, this assumes that the life-cycle of earnings and income for the Baby Boomers is essentially the same as the patterns of earlier cohorts.

Non-Wage Benefits

Since the early 1950s employers have increased the amount of non-wage benefits given employees. Non-wage benefits include such things as pensions, health benefits, paid vacation time and paid sick leave. In many respects the replacement of some portion of wage increases with more non-wage benefits makes sense for both the employer and the employee. For the employer some benefits like health insurance are tax deductible. An additional day of sick leave or an additional holiday might be offset by increased productivity. For the employee, wages are taxable. Better health cover, more sick leave or more vacation days are not taxable. These types of benefits should be included in any analysis of compensation to employees.

The amount of compensation that employees receive in non-wage benefits has increased substantially in the post-war period. However, most of the increase seems to have taken place between 1950 and 1980. Since 1980 the growth in non-wage benefits has been much smaller than in the 30 years prior. One reason for this undoubtedly is the increasing cost of health care benefits. The escalation in health care costs have caused employers to reduce coverage and reduce the number of employees covered. Census Bureau surveys indicate that 58 percent of the

population had employment-based health insurance in 1993 compared to 66 percent in 1980. Also, non-wage benefits and coverage increase disproportionately with wages. For example, less than half those earning $5 per hour or less were covered by employer-provided health insurance while more than 90 percent of those earning $15 per hour or more were covered in 1992.

Payroll Taxes

Taxes affect the wage income of U.S. workers. Social Security and Medicare payroll taxes are much higher today than in the 1960s. Payroll taxes have increased to the point where they represent more than one-third of federal revenues. In addition, payroll taxes are regressive, hurting lower income employees most. Some earnings by business that might have gone into employee compensation are instead directed into taxes and transfer payments.

Technological Advances and the Education Premium

A final group of theories argues that increases in technology and the need for an educated workers is the cause of income inequality. This theory argues, for example, that computers are substitutes for workers at lower income levels and complements for workers at higher levels. As industries make better use of new technologies, the workforce is pulled in opposite directions, with lower skilled employees being replaced by the technology and higher skilled employees benefiting from it.

Throughout history, technological advances have always put some workers out of a job while simultaneously creating new jobs. The difference is that today those losing their jobs do not appear able to gain the benefit from the newly created jobs. It is because of this shift in all industries toward more educated and higher skilled workers, that many economists look beyond theories that concentrate only on the manufacturing sector. It appears that there is a large and fundamental shift in the economy that is leaving those without skills and/or higher education behind.

Some General Conclusions

In general, economists agree that some combination of trade, technology, low productivity, education, immigration, tax policy and union weakness have contributed to depressed earnings for unskilled workers at the same time that skilled workers and college graduates prosper, or at least maintain their real earnings levels. Identifying all the causes and the amount contributed by each is difficult. Trade and immigration are obvious and easy targets, but by themselves, they cannot explain the widespread nature of income inequality and lagging earnings growth. Technology has had a powerful impact on the economy, yet it has positive as well as negative implications for workers. Some factors such as demographics and the labor force participation rate are probably beyond the effective control of policy but will likely change in the future in ways that will increase wages.

The factors that appear to be most easily changed and which could have a significant impact on slow economic growth and income inequality seem to be the public policy factors. Decreasing

payroll taxes on both workers and businesses could allow workers to take home more of their earnings. Since these taxes are regressive, those with the lowest incomes would be helped the most by a reduction in payroll taxes. However, significant reductions in payroll taxes would also affect the resources available for Medicare and Social Security. Education and training is another area where public policy could affect the level and distribution of wages. All of the stages of education from K-12 and higher education to worker training and displaced worker retraining could be reassessed with an eye toward changes that would help workers get and keep high-quality jobs. The economy, however, still must create the jobs to fully utilize an increased supply of better-trained workers.

The debate over causes for income inequality and depressed earnings often assumes that if we could only identify the correct source of the problem, policy remedies would be available to correct it. However, the debate over remedies is likely to be as contentious as the debate over causes.

RECYCLED PAPER